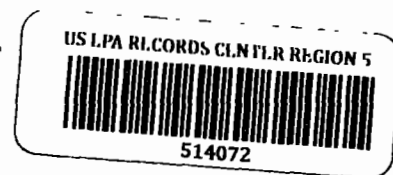


ERT Document No.: PE317-500



931289

ST. PETER AQUIFER REMEDIAL INVESTIGATION PLAN
FOR THE REILLY TAR & CHEMICAL CORPORATION
N.P.L. SITE, ST. LOUIS PARK, MINNESOTA

October 4, 1986

Ammended November 30, 1986

Prepared for:

The City of St. Louis Park
St. Louis Park, Minnesota 55416

ERT - A RESOURCE ENGINEERING COMPANY
5871 Cedar Lake Road, St. Louis Park, Minnesota 55416

CONTENTS

Section A - Site Management Plan

Section B - Quality Assurance Project Plan

Section C - Health & Safety Plan

Section D - Community Relations Plan

SECTION A
SITE/MANAGEMENT PLAN

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PURPOSE AND SCOPE

✓ The purpose of this Remedial Investigation is to determine the nature and extent of ground-water contamination in the St. Peter Aquifer in the vicinity of the former Reilly Tar & Chemical Corporation site in St. Louis Park, MN. *to gather all necessary data to support the FS. ✓*
The issue of ground-water contamination in the St. Peter Aquifer has been long debated. During the course of settlement negotiations in United States of America, et al. v. Reilly Tar & Chemical Corporation et al., an evaluation of existing data led to the agreement embodied in the Consent ^{Order} and Remedial Action Plan (RAP). It was agreed that the final Remedial Action(s) for the St. Peter Aquifer could not be precisely defined without further ~~limited~~ investigations. This Remedial Investigation does not take on the broad scope of many other Superfund Remedial Investigations, because the Consent ^{Order} specifies a scope of work limited to the installation of five new monitoring wells, and three rounds of ground-water monitoring. *Also, the results of a significant effort to evaluate alternative remedial actions have been embodied in the Consent Order.*
8.2.2 *note to cover* If this investigation identifies a spread of water that exceeds the drinking water criteria, as defined in Section 2.2 of the RAP, a Feasibility Study may be required. The Remedial Action that may be required is the installation and operation of a gradient control well system consisting of one or two gradient control wells. *although the FS will eval. if I.D. other RA ✓*
✓

To accomplish this investigation, seven tasks will be addressed: *The RI will U.S. EPA RI Guid - 0-1985 ✓*

Task 1 Description of Current Situation

Task 2 Plans and Management

Task 3 Site Investigation

Task 4 Site Investigation analysis

Task 5 Laboratory and Bench-Scale Studies

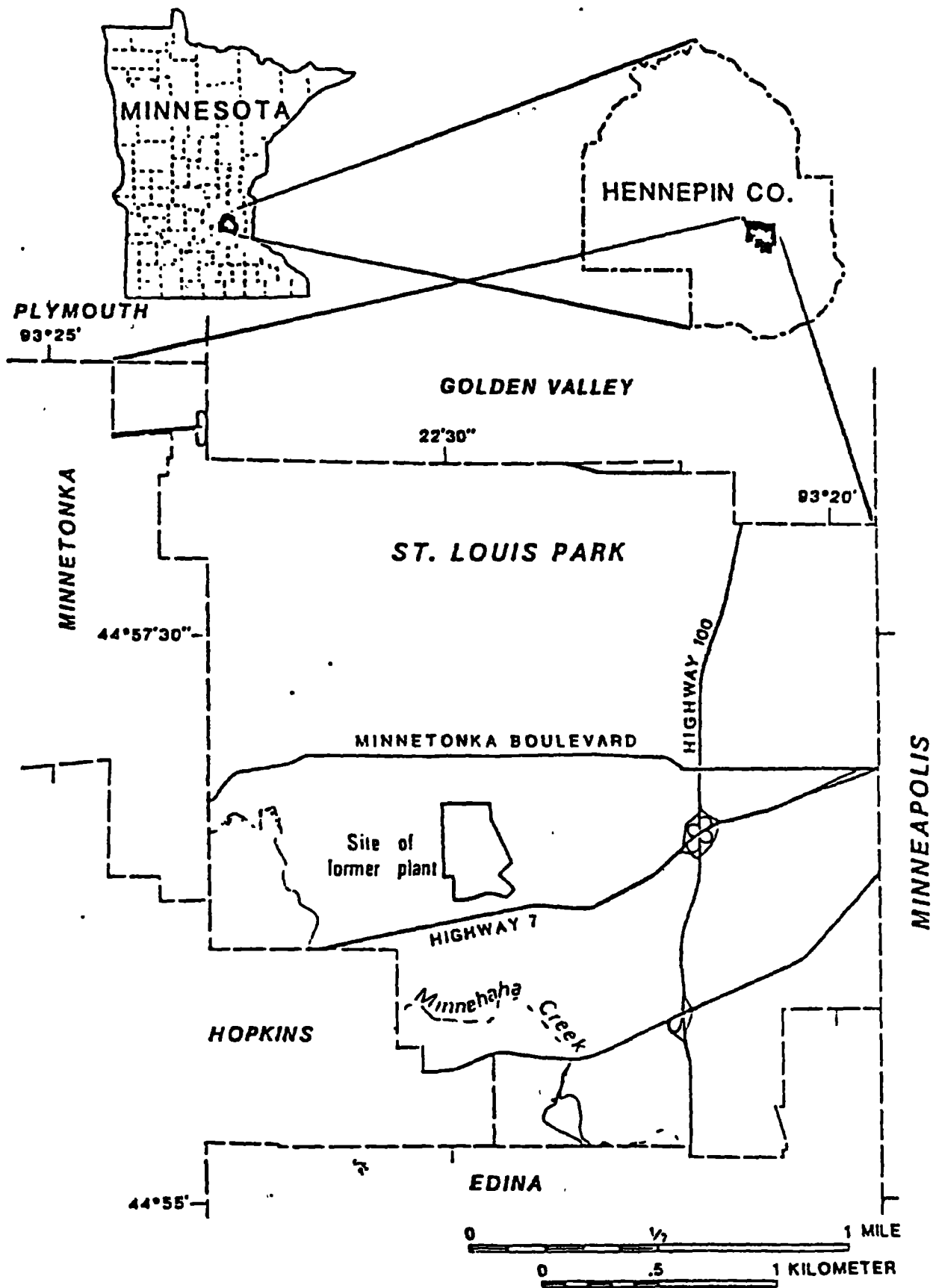
Task 6 Reports

Task 7 Community Relations Support

TASK 1 DESCRIPTION OF CURRENT SITUATION

Background and Nature and Extent of Problem

The former Reilly site occupies 80 acres in St. Louis Park (Figure 1). A coal tar refinery and wood preserving plant was operated at the site from 1917 to 1972. In 1972 the site was sold and converted



(From USGS Water Supply Paper 2211)

FIGURE 1
LOCATION MAP

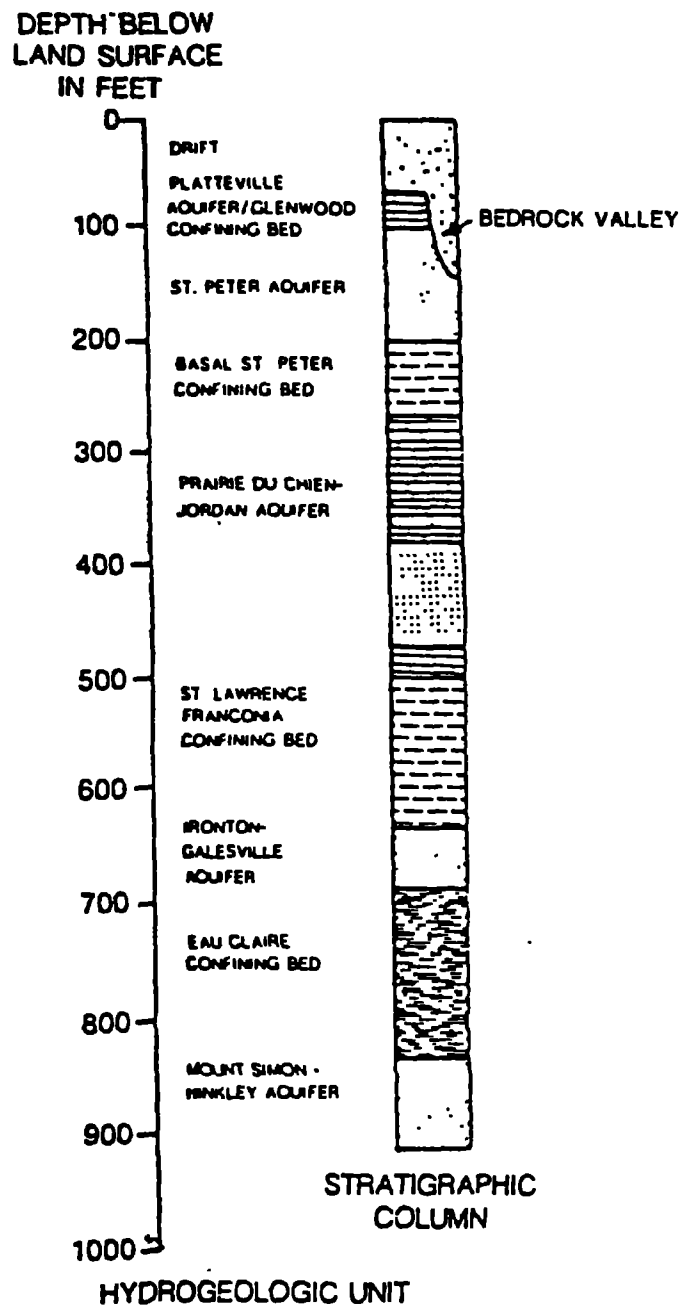
to residential and recreational uses. Also a divided four lane avenue and storm sewer improvements were constructed on the site. Soil and ground-water contamination by a variety of coal-tar-related chemicals have been observed in the immediate vicinity of the former plant site. In addition, polynuclear aromatic hydrocarbons (PAH), which are constituents of creosote and coal tar, have been measured in some of the deep bedrock aquifers in the St. Louis Park area.

The relationship between the St. Peter Aquifer and other bedrock units and glacial deposits is shown in Figures 2 and 3. At the former Reilly plant site, approximately 65 feet of drift and 30 feet of Platteville Limestone and Glenwood Shale overlie the St. Peter Aquifer. In the vicinity of the former Reilly site, within the City of St. Louis Park, the Platteville and Glenwood bedrock units have been removed by erosion, and the drift directly overlies the St. Peter (Figure 4). Wells that have been completed in the St. Peter are shown in Figure 5. Table 1 includes the available well logs for St. Peter monitoring wells. Table 2 presents the available PAH data for the St. Peter. Figure 6 shows the regional ground-water flow pattern in the St. Peter. Figure 7 shows water level contours based on more recent data provided by The Minnesota Pollution Control Agency (MPCA). Table 3 presents MPCA's water level data in tabular form.

Bedrock Valleys

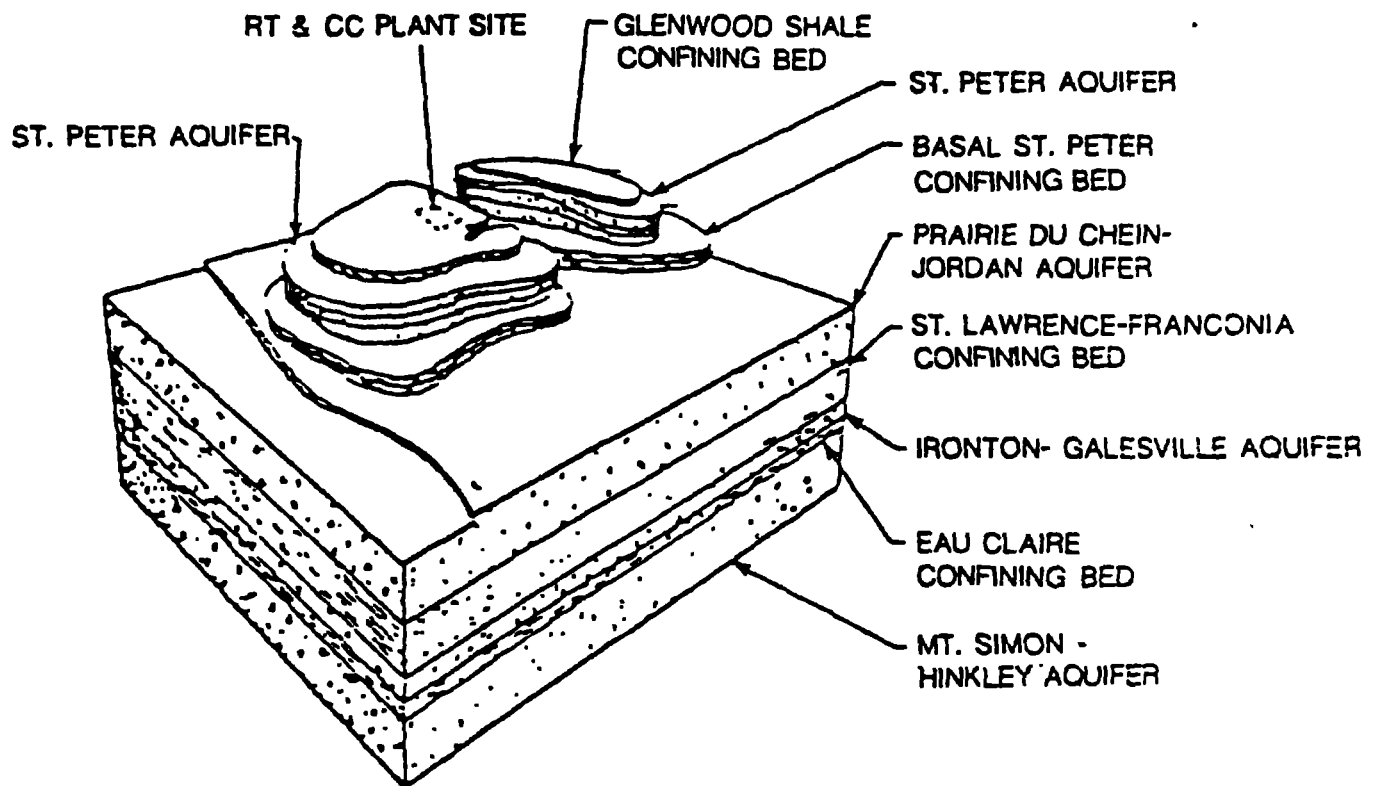
The distribution of "buried bedrock valleys" may be important if they represent a preferential pathway for contaminants to migrate from contaminated areas of the Drift-Platteville Aquifer. (Figures 8 through 14 and Tables 4 and 5) into the St. Peter Aquifer. This possibility has been suggested by the USGS in their 1981 report "Preliminary Evaluation of Ground-Water Contamination by Coal-Tar Derivatives, St. Louis Park, Minnesota". Insufficient field data exist with which to determine the role of bedrock valleys in contaminant migration, however, water level data and the presence of low permeability glacial till indicate that this particular pathway may not be a major pathway for the migration of contaminants into the St. Peter Aquifer. In addition, based on the water quality data for the Drift-Platteville Aquifer, contaminants are not migrating preferentially, along the course of bedrock valleys. Therefore, there is no indication or expectation that contaminants are entering the St. Peter Aquifer at any location outside the area of Drift-Platteville Aquifer contamination shown in Figure 8.

The RAP addresses the possibility of contaminant migration via bedrock valleys in Sections 9.1. and 9.2. These sections require source and gradient control wells for containing contaminant migration in the Drift-Platteville Aquifer (Figure 15). It is anticipated that these wells will help to prevent contamination from reaching the bedrock valleys and entering the St. Peter Aquifer.



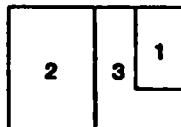
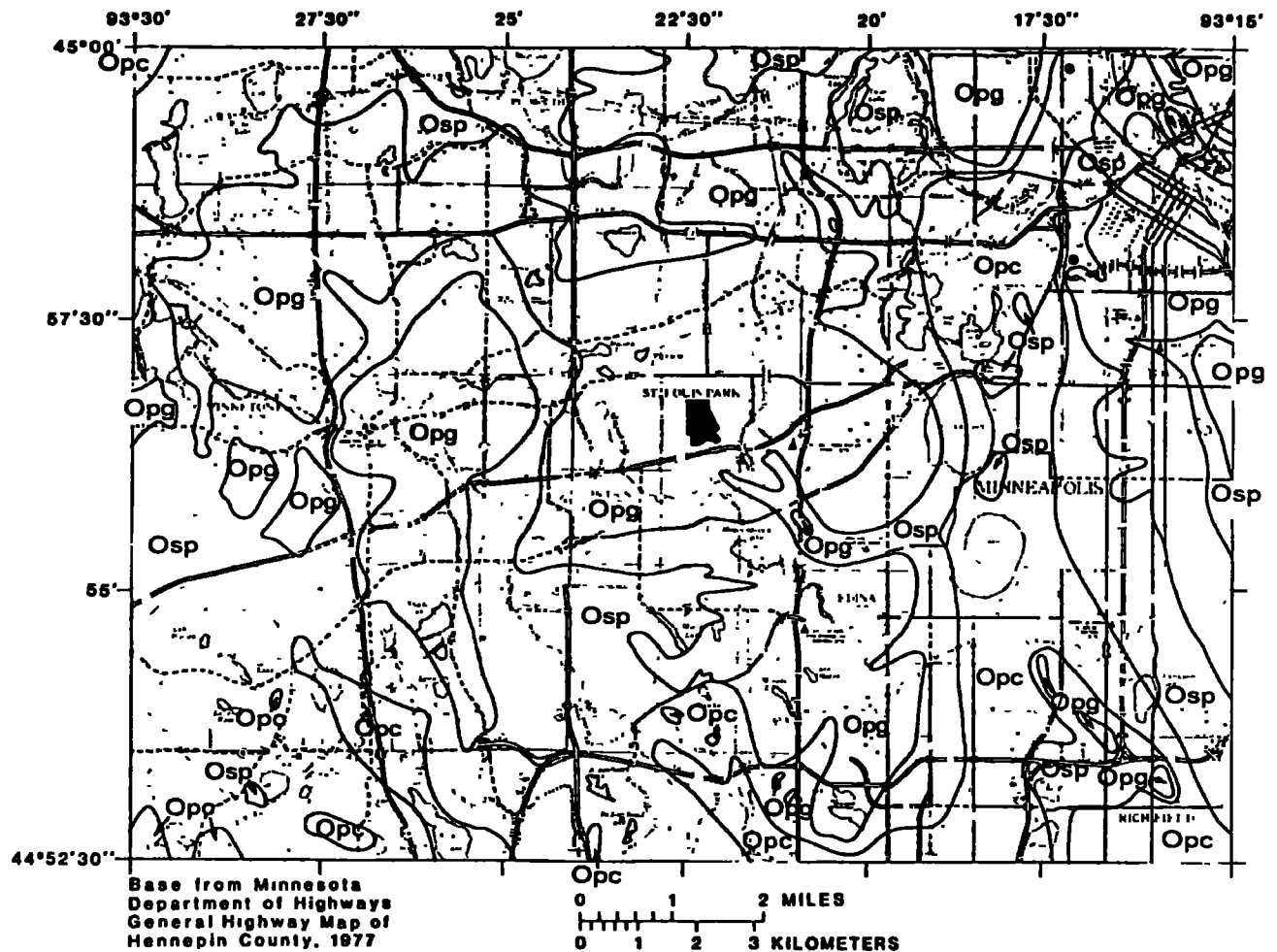
(Illustration Modified From Record of Decision, May 25, 1984.)

FIGURE 2
STRATIGRAPHIC
PROFILE



(Illustration From Record of Decision, May 25, 1984.)

FIGURE 3
GEOLOGY BENEATH
DRIFT-PLATTEVILLE
AQUIFER



1. Modified from Norvitch, R. F., and Walton, M. S., 1979, U. S. Geological Survey Miscellaneous Investigations Map I-1157

2. Modified from Minnesota Geological Survey, Unpublished Map

3. This study

INDEX TO GEOLOGIC MAPPING

EXPLANATION

CORRELATION OF MAP UNITS

Opg	Platteville and Glenwood Formations, undivided	} ORDOVICIAN
Osp	St. Peter Sandstone	
Opc	Prairie du Chien Group	

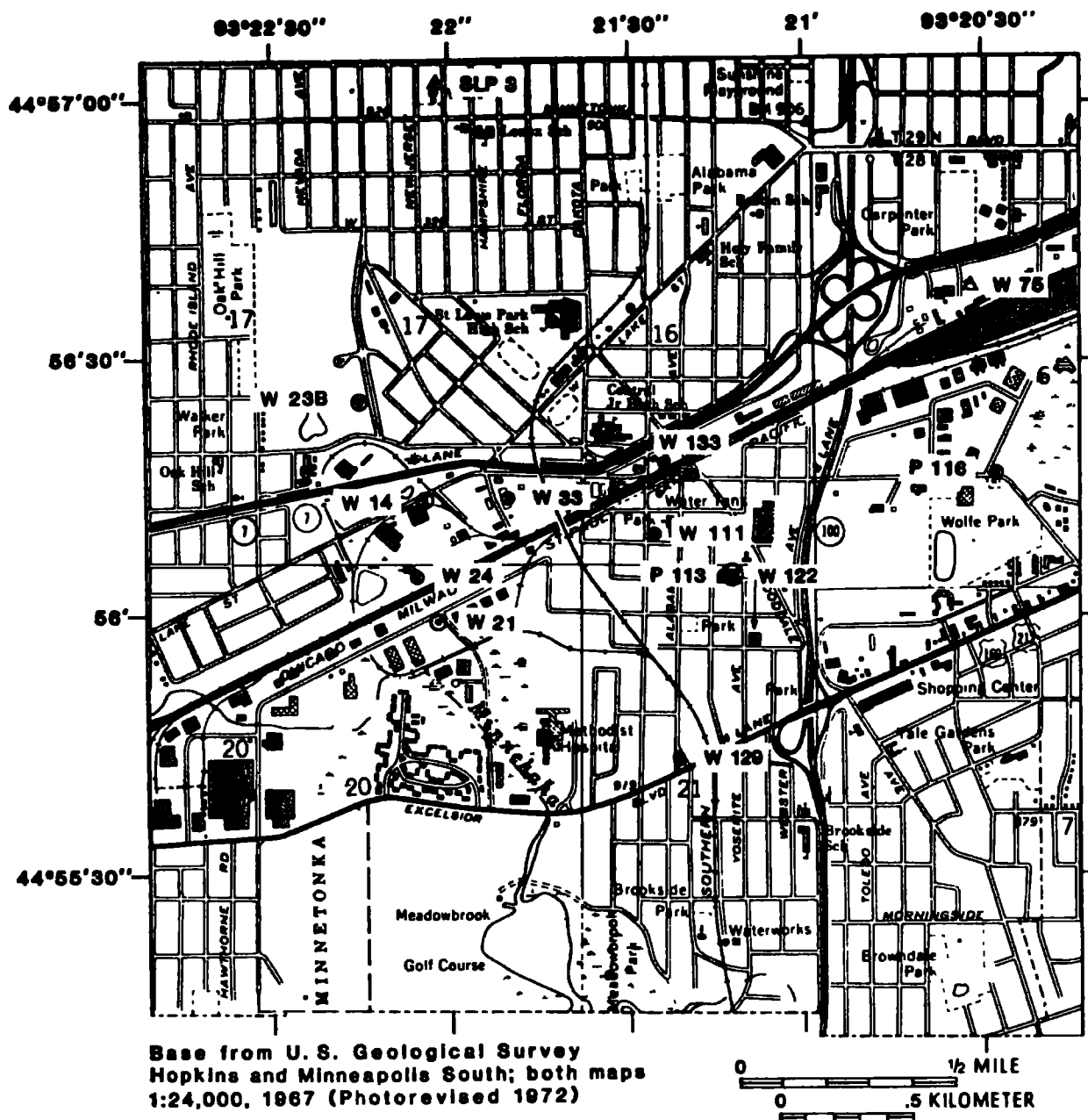
— Approximate geologic contact



Site of former plant

Figure 4.

Preliminary Bedrock Geology (WSP 2211)



EXPLANATION

- W 33 Location and project well number
 - Observation well completed in St. Peter aquifer
 - Observation well completed in basal St. Peter confining bed
 - ▼ Multiaquifer well fitted with temporary packer
 - △ Platteville-St. Peter multiaquifer well in which water levels are periodically measured
- ◎ W 14 Circle denotes well in which water levels were monitored with a digital recorder during part of 1978-81

Figure 5 Location of wells completed in the St. Peter aquifer or basal St. Peter confining bed

Table 1. Data on selected wells in the St. Louis Park area, Minnesota

Township and range: First three (or two) digits indicate township north of the baseline, next two digits indicate range north of the principal meridian, last digit(s) indicate(s) section in which well is located. Letters indicate well location in section: first letter denotes the 160-acre tract, second letter denotes the 40-acre tract; third letter denotes the 10-acre tract. Letters are assigned counterclockwise beginning with the northeast quarter. Consecutive numbers beginning with 1 are added as suffixes to distinguish wells within a given 10-acre tract.

Site identification (lat and long): First six digits are latitude of well location in degrees, minutes, and seconds; next seven digits are longitude in degrees, minutes, and seconds; last two digits are arbitrarily assigned to distinguish wells within a given 1-second by 1-second area.

Reported log: Qd, drift, undifferentiated; Opl, Platteville Limestone; Ogl, Glenwood Shale; Osp, St.

Peter Sandstone, undifferentiated; Ospl, St. Peter Sandstone, lower siltstone beds; Opc, Prairie du Chien Group; Cj, Jordan Sandstone; Cal, St. Lawrence Formation; Cf, Franconia Sandstone; Cig, Ironston and Galesville Sandstones; Ce, Eau Claire Sandstone; Cm, Mount Simon Sandstone; pCh, Hinckley Sandstone.

Altitude: When MP is given, altitude is for measuring point, not land surface.

Field measurement status: A, well field located and permanently sealed or reconstructed; AH, well field located and permanently sealed by MDH; AR, well reported permanently sealed; BR, well reported filled; D, well field located and contains debris; F, well field located; G, well field located and geophysically logged; M, mass-measurement well (measured 2 to 3 times per year); O, observation well (measured every 2 to 3 weeks); P, well field located and has pump; X, well destroyed.

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 — AAB1.	445654093215501	216030	W1	Monitoring well —	E. H. Renner	-03-76	0-102 Qd 102-107 Opl	922.76 MP	107	4 in. 0-102	Opl	43.67	11-28-78	O
117.21.17 — BAC1.	445651093222901	216031	W2	— do —	— do —	—03-76	0-36 Qd	897.14 MP	36	4 in. 0-32	Qd	10.40	11-28-78	O
117 21 17 — BDB1.	445637093222401	216032	W3	— do —	— do —	—05-76	0-52 Qd	897	52	4 in. 0-49	Qd	7	05-10-76	D,X
117.21.17 — CAD2.	445622093221901	216033	W5	— do —	— do —	—02-76	0-26 Qd	891.72 MP	26	4 in. 0-21	Qd	6.59	11-28-78	O
117 21.17 — CAC1	445620093222601	216034	W6	— do —	— do —	—02-76	0-26 Qd	892.74 MP	26	4 in. 0-22	Qd	7.39	11-28-78	O
117 21.17 — CBD1.	445625093223601	216035	W7	— do —	— do —	—03-76	0-71 Qd	930	71	4 in. 0-66	Qd	35	03-02-76	D,X
117.21.17 — CDD1	445607093222101	216036	W8	— do —	— do —	—02-76	0-31 Qd	892.87 MP	31	4 in.	Qd	7.96	11-28-78	O
117 21.17 — DCA1.	445614093220301	216037	W9	— do —	— do —	—02-76	0-25 Qd	891.21 MP	25	4 in. 0-20	Qd	7.13	11-27-78	O
117 21 20 — ABD1.	445559093220201	216038	W10	— do —	— do —	—02-76	0-29 Qd	891.82 MP	29	4 in. 0-25	Qd	7.63	11-27-78	O
117.21.17 — DDB2.	445614093215301	216039	W11	— do —	— do —	—11-76	0-23 Qd	897.20 MP	23	4 in. 0-19	Qd	13.63	11-27-78	O
117 21 17 — DDA1	445613093214001	216040	W12	— do —	— do —	—12-76	0-47 Qd	919.26 MP	47	4 in. 0-42	Qd	37.02	11-27-78	O
117 21 17 — DCB1	445615093220901	216041	W13	— do —	— do —	—11-76	0-50 Qd	890.40 MP	50	4 in. 0-45	Qd	6.19	11-28-78	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 — DCA2.	445614093220302	216042	W14	— do —	— do —	02-77	0-68 Qd 68-82 Opl 82-85 Ogl 85-95 Osp	891.41 MP	95	8 in. 0-69 4 in. 0-86	Osp	23.75	11-27-78	G,O
117.21.17 — CAC2.	445621093222601	216043	W15	— do —	— do —	04-77	0-76 Qd	892.47 MP	76	4 in.	Qd	8.30	11-28-78	O
117.21.20 — ABD2	44559093220202	216044	W16	— do —	— do —	04-77	0-73.5 Qd	892.07 MP	64	4 in. 0-61	Qd	8.56	11-27-78	O
117.21.17 — DDB3	445614093215302	216045	W17	— do —	— do —	04-77	0-69 Qd	897.07 MP	69	4 in. 0-66	Qd	14.05	11-27-78	O
117.21.17 — DCA3	445614093220303	216046	W18	— do —	— do —	1978	0-68 Qd 68-78 Opl	893.23 MP	78	4 in. 0-68	Opl	9.86	11-27-78	O
117.21.17 — CDD2.	445607093222102	216047	W19	— do —	— do —	1978	0-72 Qd 71-81 Opl	894.43 MP	81	4 in. 0-81	Opl	11.22	11-28-78	O
117.21.20 — AAB1	445605093215101	216048	W20	— do —	— do —	1978	0-69 Qd 69-80 Opl	895.55 MP	80	4 in. 0-70	Opl	14.01	11-27-78	O
117.21.20 — ABD3	44559093220203	216049	W21	— do —	— do —	1978	0-87 Qd 87-92 Osp	892.60 MP	92	4 in. 0-92	Osp	24.27	11-27-78	O
117.21.17 — CAA1.	445630093222101	200993	W22	Republic Creosote Washroom Well.	— do —	12-47	0-65 Qd 65-91 Opl 91-91 Osp	896.16 MP	91	4 in. 0-71	Originally Opl-Osp Now Opl	11.44	11-28-78	G,O
117.21.17 — CAD1.	445625093221601	216050	W23	Republic Creosote Site "Hunckley" well on site, Cooling well.	— McCarthy —	12-17 to 05-18.	0-60 Qd 60-95 Opl 95-195 Osp 195-258 Opl 258-372 Opc 372-457 Cj 457-507 Csl 507-835 Cf-Cc 835-909 Cm	894.49 MP	909	12 in. 0-65 10 in. 0-257 7 in < 230-373	Originally Cj, Csl, Cf, Cig, Cc, Cm Now Osp, Opc, Cj, Csl, Cf.	33.15	11-28-78	G,O
117.21.20 — ABB1.	445604093220501	160018	W24	Monitoring well	— E. H. Renner —	1978	0-81 Qd 81-83 Opl 83-86 Ogl 86-90 Osp	892.92 MP	90	8 in. 0-81.5 4 in 0-86.7	Osp	22.84	11-27-78	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21 17 --- CDC2.	445610093222602	206448	W25	Lakeland Door	do	11-50	0-79 Qd 79-85 Opl	888 79 MP	85	3 in. 0-79	Opl	4.39 9	10-15-78 11-01-90	G,O
117 21 17 --- CDA1.	445619093221801	209344	W26	Mill City Plywood	do	08-52	0-59 Qd 59-90 Opl	891.45 MP	90	4 in. 0-76	Opl	6.90 3.5	10-13-78 08-05-52	G,O
117.21 17 --- DBC1	445624093220801	216052	W27	Terry Excavating	do	1953	0-80 Qd 80-100 Opl 100-112 Osp	905	112	4 in.	Opl-Osp	30	1953	G,O
117 21 17 --- CDB1.	445619093222501	216053	W28	7401 Walker St		Before 1939	—	895	—	—	—	—	—	X
117 21 20 --- BAA2.	445604093223801	206454	W29	Flame Industries	E. H Renner	04-63	0-73 Qd 73-90 Opl 90-94 Ogl 94-202 Osp 202-251 Ospl 251-335 Opc	897	335	10 in. 0-77 8 in. 0-257	Opc	68	04-12-63	P
117 21 17 --- CCA2	445614093223801	216054	W30	3636 Quebec Ave	do	About 1940	—	935	200	6 in. 0-100	Opl-Osp	—	—	AH
117.21 20 --- BBB1	445600093224901	216055	W31	3831 Texas Ave		About 1949	—	905	—	—	—	—	—	—
117.21 07 --- DDD1	445702093225401	203190	W32	Texatanka Shopping Center	E. H Renner	08-51	0-98 Qd 98-112 Opl 112-117 Ogl 117-228 Osp 228-283 Ospl 283-405 Opc 405-466 Cj	925	466	8 in. 0-283.5	Opc-Cj	80	08-00-51	F
117 21 17 --- DDB1	445614093214901	206449	W33	Strand Mfg., Wayne Register, Midco Register, Robinson Rubber	Max Renner	06-53	0-80 Qd 80-100 Opl 100-102 Ogl 102-182 Osp	906 37 MP	182	8 in.	Opl-Osp Osp (from 6-79).	23.62 45.97	11-27-78 07-10-79	P,G
117.21.16 --- CAA1.	445627093213601	216056	W34	Cnb Diaper Service, Sterilized Diaper Service.	Bergerson, Caswell	05-67	0-93 Qd 93-107 Opl 107-113 Ogl 113-212 Osp 212-280 Ospl 280-342 Opc	918	342	6 in. 0-292	Opc	99.1	11-08-78	AH,G

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.16 --- DAA1	445625093210301	216057	W35	Burdick Grain Co. ---	-----	About 1910	---	912	---	4 in.	Opl(?)—Osp(?)	51.6	10-20-78	P,M
117.21.16 --- DBD1.	445620093211901	216058	W36	Dayton Rogers ---	-----	Before 1947	---	908	---	3 in.	Qd	31.77	10-25-78	F,O
117.21.16 --- DBD2.	445619093211801	216059	W37	Dayton Rogers ---	Laurel ---	03-73 Hansmann	---	910	120	6 in.	Opl	36.03	10-25-78	O,G
117.21.16 --- CDB1.	445618093211801	216060	W38	Milwaukee ---	-----	1913	0-107 Qd 107-111 Opl 111-260 Osp 260-405 Opc 405-485 Cj 485-515 Cal 515-1002 Cf-pCh	914	1002	---	Opl-pCh	---	---	---
117.21.16 --- DCA3	445613093212201	216061	W39	3612 Alabama Ave -	-----	---	---	910	---	---	Osp	---	---	X
117.21.16 --- CDB2.	445615093211601	206444	W40	Minnesota Rubber --	-----	1963	0-125 Qd 125-205 Osp 205-276 Ospl 276-378 Opc	910	378	8 in. 0-205	Osp-Opc	---	---	P
117.21.16 --- DCC3	445611093213401	216062	W41	Hartmann #1 ---	E. H Renner ---	---	---	912	160	2 in.	Osp(?)	---	---	D
117.21.16 --- DCC1	445611093213401	216063	W42	Hartmann #2 ---	-----	---	---	912	60	---	---	---	---	---
28.24 7 --- BBC1	445559093210301	200541	W44	King's Inn, ---	Max Renner ---	12-51	0-111 Qd 111-131 Opl 131-259 Osp	910	259	8 in. 0-111	Opl-Osp	47	1951	P
117.21.16 --- CDA1	445618093210001	206445	W45	S-K Products, ---	Don Stodola's ---	07-63 Well Drilling	0-92 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	900	312	8 in. 0-? 6 in. 0-244	Ospl-Opc	84	07-25-78	P
117.21.16 --- CDA2.	445617093210201	216065	W46	--- do ---	--- do ---	1973	0-92 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	905	305	6 in. 0-234	Ospl-Opc	95	02-16-73	P

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
28 24.6 — AAC1	445647093195301	216066	W47	Belco; Burdick Grain Co	—	Before 1942	—	891	—	8 in.	Opl-Cj	16.39	12-06-78	G,A
117.21 20 — ADA2	445646093214601	216067	W48	Methodist Hospital.	McCarthy	—	0-85 Qd 85-94 Opl 94-257 Osp 257-377 Opc 377-466 Cj 466-485 Csl	889.8	485	20 in. 0-255	Ospl(?) Opc-Csl	68.82	12-06-78	G,P
117.21.17 — DDD1	445607093214101	206540	W49	Strom Block, deep well	E. H. Renner	-1958	0-72 Qd 72-92 Opl 92-96 Ogl 96-260 Osp 260-381 Opc 381-384 Cj	900	384	8 in. 0-77 6 in. 0-241	Ospl-Cj	65	09-00-58	—
117.21.17 — DCD1	445609093215801	216068	W50	Prestolite	—	Before 1937	—	890	—	—	—	—	—	G,AH
117.21.20 — BAA1.	445605093221601	216069	W51	Androc Chemical Co.	—	—	—	892	—	4 in.	Opl	—	—	G,AH
117 21.20 — BCA1	445548093223701	216070	W52	Ment Gage Co ; Suburban Sanitary Drainage	E. H. Renner	-09-61	0-81 Qd 81-95 Opl 95-97 Ogl 97-110 Osp	920	—	4 in. 0-82	Opl-Osp	30	09-29-61	G,AH
28 24.6 — BDB2	445638093204001	216071	W53	Northland Aluminum.	—	—	—	884	—	—	—	84.10	06-22-79	F
117 21 19 — AAD1	445553093225401	216072	W54	Old Galachurche residence	—	—	—	920	—	6 in.	—	—	—	—
117.21.20 — BBA1	445605093223501	216073	W55	7612 Division St.	E H Renner	-01-59	0-99 Qd 99-118 Opl	915	118	4 in. 0-102	Opl	36	1959	—
117.21.17 — CCB1	445619093224201	216074	W56	Earlinton residence	—	—	—	935	—	4 in.	—	—	—	—
117 21.17 — CCA1.	445619093223801	216075	W57	Oak Hill School	—	Before 1940	—	935	—	—	—	—	—	—
117.21.17 — DBB1	445628093221101	216077	W59	On site east of Louisiana Extension	—	—	—	—	24	6 in. 0-15	Qd	—	—	AH

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117 21 17 --- CCA3	445614093224001	216078	W60	3645 Rhode Island -- Ave	E. H. Renner	-----	---	935	250	6 in.	Opl-Osp	---	---	AH
117.21.17 --- DDD3	445607093214001	216079	W61	William V. Terry	-----	---	---	905	---	---	---	---	---	---
117 21 8 --- CAA1	445721093221801	206438	W62	McCourtney Plastics.	do	09-66	0-86 Qd 86-103 Opl 103-105 Ogl 105-274 Osp 274-394 Opc	910	394	12 in. 0-90 10 in 0-246	Osp-Opc	88	09-08-69	P
117.21.20 --- CBB1	445538093224501	216080	W63	National Foods	McCarthy	09-45	---	910	285	10 in. inside 12 in	---	75	09-00-45	P
117 21 17 --- DDD4	445607093214202	206451	W65	Ace Manufacturing - Strom Block.	E. H. Renner	09-58	0-77 Qd 77-93 Opl 93-95 Ogl 95-109 Osp	904	109	4 in. 0-77	Opl-Osp	24.68	12-01-78	F
117.21.19 --- ABA2	445559093220502	216081	W66	Black Top Service, - deep well	do	01-56	0-65 Qd 65-86 Opl 86-87 Ogl 87-251 Osp 251-280 Opc	899	280	6 in	---	---	---	BR
117.21 19 --- ABA1	445559093220501	216082	W67	Black Top Service, - shallow well.	do	12-55	0-78 Qd 78-84 Opl 84-85 Ogl 85-105 Osp	812	105	3 in. 0-84	Opl(?)--Osp	25	12-29-55	---
117.21.20 --- BAC1	445604093223001	206447	W68	Bergeson Residence.	Aamot	12-61	0-95 Qd	900	110	2 in. 0-90	Qd	40	12-00-61	P
28.24 6 --- CAA1	445614093203601	216083	W69	Hedberg-Friedheim - Block Co.; Wolfe Lake Augmentation Well	Max Renner	07-47	0-71 Qd 71-78 Opl 78-81 Ogl 81-246 Osp 246-327 Opc	890	327	---	---	65	1947	G
28 24 6 --- BAA1	445653093202601	200539	W70	Park Theatre	do	09-39	0-74 Qd 74-104 Opl 104-229 Osp 229-358 Opc 358-398 Cj	905	398	10 in 0-74 8 in 0-229	Opc-Cj	46	1939	P

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
28.24 07 — CABI.	445533093203401	200543	W71	Carns residence — do —	—	03-58	0-70 Qd 70-86 Opl	880	86	4 in. 0-70	Opl	16	03-00-58	—
28.24.07 — DBA1	445533093200701	216085	W72	Harder residence — Pederson —	—	12-58	0-138 Qd 138-153 Osp	925	153	—	Osp	—	—	—
117.21.19 — ACA	—	216086	W73	Jasperson Dairy — E. H. Renner —	—	05-52	0-87 Qd 87-114 Opl 114-120 Opl 120-144 Osp	915	144	6 in. 0-90.3	Opl-Osp	22	05-22-52	—
117 21.08 — CAA1.	445721093221801	216087	W74	Landers Gravel — McCarthy —	—	09-21	0-82 Qd 82-100 Opl 100-265 Osp 265-280 Opc	890	280	—	Opl(?) Osp(?)—Opc	31	09-00-21	AR
28.24 6 — BDB1.	445639093203201	216089	W75	Park Pet Hosp — Max Renner —	—	1951	0-67 Qd 67-130 Opl-Osp	884	130	6 in. 0-67	Opl-Osp	33.51	12-11-78	P
28.24 06 — ABC1.	445644093202101	216090	W76	Professional — do —	—	1946	—	882	184	6 in.	Opl(?)—Osp	—	—	P
117 21 19 — CBD1	445608093240301	216093	W80	Red Owl — Keys —	—	10-46	0-99 Qd 99-117 Opl 117-279 Osp 279-397 Opc 397-502 Cj	920	502	16 in 0-279 12 in 0-304	Opc	70	10-03-46	—
29 24.30 — BCC1.	445916093205101	201039	W82	Weldwood Nursing - Bergeson- Caswell.	—	10-57	0-56 Qd 56-67 Opl 67-235 Osp 235-348 Opc 348-444 Cj	878	444	12 in. 0-56 6 in. 0-348	(?)-Cj	50	11-07-57	—
29 24.29 — CBC1	445808093103901	201014	W86	Prudential — Layne —	—	07-54	0-243 Qd 243-257 Osp 257-383 Opc 383-467 Cj 467-470 Ccl	925	470	16 in. 0-259	Opc-Csl	78	07-00-54	—
117 21.17 — BAC2	445651093222902	149710	W100	Monitoring well — E. H. Renner —	—	12-78	0-73 Qd 73-88 Opl	910	88	4 in. 0-73	Opl	13.03	12-26-78	O
117 21.16 — CDB2	445617093211501	149711	W101	Monitoring well — do —	—	12-78	0-100 Qd 100-106 Opl	910	106	4 in. 0-103	Opl	52.41	12-26-78	G,O
—	—	216102	W104	Rice Gravel & Sand —	—	1935	—	—	250	12 in.	Opc(?)	—	—	—

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21 17 --- CA1	---	200979?	W105	Minnesota Sugar Beet Co	Swenson	1899	0-73 Qd 73-93 Opl 93-260 Osp 260-385 Opc 385-504 Cj 504-950 Csl-Cm	892	950	—	Opl-Cm(?)	—	—	—
28 24 6 --- CAA2	445614093204102	216103	W106	Hedberg, Friedheim & Co.		Before 1936	0-90 Qd 90-100 Opl 100-230 Osp	900	230	—	Opl(?)—Osp	—	—	—
28.24 06 --- BCD1.	445634093204101	216104	W107	Interior Elevator Co., Salem Ave. and Chicago & Milwaukee Rail Road tracks		About 1893	0-75 Qd 75-100 Opl 100-250 Osp 250-390 Opc 390-495 Cj 495-710 C1-Cf 710-755 Cig	875	755	—	Opl(?)—Cig	—	—	—
117 21 21 --- BAB1.	445605093211201	216029	W108	5800 Goodrich	E. H. Renner	Before 1936	—	—	—	—	—	—	—	—
117 21 09 --- CDC1.	445658093211201	216105	W109	Max Renner's Shop.	Max Renner	Before 1936	0-93 Qd 93-113 Opl 113-118 Osp	925	118	—	Opl(?)—Osp	—	—	—
117 21 16 --- CCD1	445609093212501	216107	W111	6030 Oxford St	do	Before 1936	0-190 Qd 190-240 Osp	919	240	—	Osp	—	—	G
117.21 16 --- CCA1	445615093212301	206443	W112	Old St. Louis Park Well #1	McCarthy	05-32	0-109 Qd 109-274 Osp 274-398 Opc 398-486 Cj 486-540 Csl	917.52	540	16 in. 0-212 12 in 194-274	in 1932 Opc-Csl in 1978 Opc	77	12-21-78	G,M
117 21.8 --- DCB3	445701093215803	206440	W113	St. Louis Park No. 3	do	08-39	0-103 Qd 103-118 Opl 118-286 Osp	922	286	24 in. 0-103	Opl—Osp	60	08-00-39	P
28 24.6 --- CAA3.	445614093204103	216108	W114	Hedberg, Friedheim & Co.	E. H. Renner	Before 1936	0-60 Qd 60-80 Opl 80-249 Osp	887	249	—	Opl(?)—Osp	—	—	F
117 21.20 --- ABD1	445554093220301	216109	W115	Monitoring well	Bergerson-Caswell	02-79	0-65 Qd 65-78 Opl 78-78 Ogl	892.16 MP	78	4 in. 0-66	Opl	10.85	02-12-79	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117 21 16 --- DCB3	445634093205903	160030	W116	----- do -----	E H Renner	-04-79	0-67 Qd	909.59	67	0-4 in. 0-63	Qd	35.01	06-05-79	O
117 21.16 --- CDB3	445617093211502	160031	W117	----- do -----	do	-04-79	0-72 Qd	917.73 MP	72	4 in. 0-68	Qd	39.68	06-05-79	O
117.21 20 --- CDC1.	445516093222501	216088	W118	Minneapolis Park Board-Meadowbrook Golf Course	do	-----	0-80 Qd 80-89 Opl 89-245 Osp 245-370 Opc 370-485 Cj 485-487 Csl	905	487	---	Opc-Csl	---	---	---
117 21 20 --- DAC1	445527093215201	216009	W119	----- do -----	-----	-06-35	0-74 Qd 74-82 Opl 82-90 Ogl 90-252 Osp 252-375 Opc 375-465 Cj 465-502 Csl	890	502	16 in. 0-77 12 in. 77-257	Opc-Csl	54.5	06-28-35	---
117 21 16 --- DCA2	445014093212802	165516	W120	Monitoring well	E H Renner	-07-79	0-95.5 Qd 95 8-98 Opl, (weathered) 98-107 Opl 107-108 6 Ogl	919.8 MP	105.7	4 in. 0-98	Opl	38.84	07-12-79	G,O
117 21 21 --- BBD1	445558093212001	165577	W121	----- do -----	do	-07-79	0-110 Qd 110-115 Opl, (weathered) 115-117 Ogl	918	113.25	4 in. 0-109	Opl	53.58	07-18-79	G,O
117 21.21 --- BAD1	445557093210901	165578	W122	----- do -----	do	-08-79	0-120 Qd 120-212 Osp 212-239 Ospl	920	239	4 in. 0-217	---	---	---	G,O
117 21 21 --- BBC1	445559093213201	216129	W140	Cambridge Brick	-----	---	---	---	---	4 in.	Opl?	---	---	D
117.21 17 --- DDD5	445607093214203	216051	W143	6425 Oxford St	-----	---	0-70 Qd 70-90 Opl	---	---	4 in. 0-70	Opl	---	---	G
28 24 06 --- BCD2	445634093204102	216128	W144	Interior Elevator	-----	---	---	---	---	---	---	---	---	F

Table 1.—Data on selected wells and piezometers in the St. Louis Park area, Minnesota.—Continued

Township and range	Site identification (latitude and longitude)	Minnesota well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Driller's log	Land surface altitude, in feet	Reported depth of well, in feet	Casing schedule	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117-21-16 CD13	44551709321001	165580	V 123	Monitoring Well	E. H. Renner	08-79	0-90 90-100 100-105	909.37 RP	103	4 in. 0-93	Qpl	32.91 (below RP)	1-21-81	0.0
028-24-06 CD12	44551709321002	165579	V 124	do	U.S. GEOLOGICAL SURVEY WATER RESOURCES DIVISION 702 POST OFFICE BUILDING ST. PAUL, MINNESOTA 55101	08-79	0-71 71-80 80-85 85-86	817.66 RP	84	4 in. 0-74	Qpl	17.41 (below RP)	1-22-81	0.0
117-21-20 AD11	44551509321201	227960	V 125	Cable-tool drilling	do	08-79	0-70 70-77	890.87 RP	no well	no	Qpl	PROVISIONAL RECORDS Subject to Revision		
028-24-07 ED11	44551509321301	165581	V 126	do	do	09-79	0-105 105-122 122	912.97 RP	123	4 in. 0-110.5	Qpl	45.04 (below RP)	1-22-81	0.0
028-24-07 ED12	44551509321302	165582	V 127	do	do	09-79	0-71 71-90 90	881.5 RP	90	4 in. 0-75	Qpl	13.46 (below RP)	1-22-81	0
117-21-21 ED12	44551509321202	165583	V 128	do	do	09-79	0-67	923.84 RP	67	4 in. 0-63	Qpl	45.6 (below RP)	1-22-81	0
117-21-21 ED11	44551509321201	165584	V 129	Monitoring Well	do	10-79	0-103 103-117 117-122	913.2	122	4 in. 0-118	Qpl	45.20 (below RP)	1-22-81	0
117-21-20 AD12	44551509321401	165585	V 130	do	do	09-79	0-80 80-85 85-86 86-88	891.6	86	4 in. 0-80	Qpl	12.55 (below RP)	1-22-81	0
117-21-16 ED11	445515093218101	165586	V 131	do	do	10-79	0-94 94-107 107-	915.9	107	4 in. 0-97.5	Qpl	35.42 (below RP)	1-21-81	0
117-21-21 ED11	44550093213701	165587	V 132	do	do	10-79	0-78 78-84 84-93 93-	901.8	93	4 in. 0-86	Qpl	23.11 (below RP)	1-22-81	0
117-21-16 CD12	445517093212002	165588	V 133	do	do	11-79	0-105 105-122	916.8	122	4 in. 0-116	Qpl	51.13 (below RP)	1-22-81	0
117-21-16 CD13	445517093212003	165589	V 134	do	do	11-79	0-73 73-90 90-	916.63	73	4 in. 0-69	Qpl	37.42 (below RP)	1-22-81	0
117-21-21 BA12	445515093210802	165590	V 135	do	do	11-79	0-80	914.6	80	4 in. 0-76	Qpl	43.20 (below RP)	2-21-81	0
117-21-16 ED11	445515093213103	165591	V 136	do	U.S. GEOLOGICAL SURVEY WATER RESOURCES DIVISION 702 POST OFFICE BUILDING ST. PAUL, MINNESOTA 55101	11-79	0-53	915.8	53	4 in. 0-49	Qpl	35.0 (below RP)	1-22-81	0
117-21-17 ED11	445515093220903	165592	V 137	do	do	12-79	0-70 70-87 87-	890.0	87	4 in. 0-73	Qpl	7.63 (below RP)	1-22-81	0
117-21-19 AD11	44555409321501	227957	V 200	Gun Club Well	do						Qpl	15.52 (below RP)	12-24-81	0
117-21-17 ED11	445511093215301	227961	V 201	Monitor Drill	do						Qpl	PROVISIONAL RECORDS Subject to Revision		
117-21-16	445515093211601	227959	V 202	Minn. Rubber	Amot	1963	0-12 12-20 20-27 27-37		378	8 in. 0-205	Qpl	24 (below RP)	8-28-56	0.48
028-24-06 CD11	44551509321204201	227961	V 211	Base Lake Yards (Millwaukee R.R.)	E. H. Renner	8-56	0-75 75-92 92-94 94-105	90015	105	4 in. 0-79	Qpl	24 (below RP)	8-28-56	0.48
118-21-29 ED11	445558093213901	203892	V 212	Honeywell 1	Tri-State Drilling	3-57	0-11 11-18 18-21 21-35 35-41 41-42	895	427	20 in. 0-185 16 in. 0-250	Qpl	39 (below RP)	3-57	P

Township and range	Site identification Lat - Long	Minnesota unique well number	USGS project well number	Land surface altitude	M.P. altitude (as of Mar. 1982)	Well depth	Casing diameter (inch)	Casing depth (feet)	Geologic logs	Hydrologic unit Open to well bore (wells screened near water table are designated Wt)	Remarks
PROVISIONAL RECORDS Subject to Revision											
117N21W17CDB2	445625093223602	216110	P1	---	929.9	---	---	---	---	---	Destroyed Installed by Barr Engineering Co. Destroyed 1 1/2 inches x 2 feet x 10 slot screen Do
117N21W17DDA1	445616093214301	216111	P2	920.8	920.94	50	---	0-48	0-50 Qd	48-50 Qb	
117N21W17DCD1	445607093220401	216112	P3	892.2	892.50	---	---	---	---	---	
118N21W31BCC1	---	216113	P4	900.0	900	23	---	0-21	0-32 Qd	21-23 Wt	
117N21W07CBA1	445717093235601	216114	P5	930	932.7	47	1 1/2	0-45	0-47 Qd	45-47 Wt	
028N24W18DBB1	445442093202601	216115	P6	880	881.18	18	1 1/2	0-16	0-18 Qd	16-18 Wt	Do
117N21W17CDC2	445610093222601	216116	P7	890.5	889.59	---	---	---	---	---	Do
117N21W17DCA4	445614093220304	216117	P8	890.4	892.43	11	1 1/2	0-9	0-11 Qd	9-11 Wt	Do
117N21W17CDD3	445607093222103	216118	P9	891.4	893.85	13 1/2	1 1/2	0-11 1/2	0-15 Qd	11 1/2-13 1/2 Wt	Do
117N21W17DDA2	445616093214302	216119	P10	921.9	923.89	49 1/2	1 1/2	0-47 1/2	0-50 Qd	47 1/2-49 1/2 Wt	Do
117N21W17DDB1	445614093215303	216120	P11	896.0	897.80	14	1 1/2	0-12	0-16 Qd	12-14 Wt	Do
117N21W17DBB1	445628093220901	216121	P12	899.5	903.43	40	1 1/2	0-38	0-42 Qd	38-40 QM	Do
117N21W17BDD1	445633093221801	216122	P13	894.3	896.93	62	1 1/2	0-60	0-72 Qd	60-62 Qb	Permanently sealed
117N21W17DCA5	445614093220305	216123	P14	890.3	893.33	42	1 1/2	0-40	0-50 Qd	40-42 QM	Permanently sealed
117N21W17DCA6	445614093220306	216124	P15	890.3	893.06	67	1 1/2	0-65	0-67 Qd	65-67 Qb	1 1/2 inches x 2 feet x 10 slot screen
117N21W16DCB1	445634093205901	227902	P16	906.3	909.33	35	1 1/2	0-33	0-37 Qd	33-35 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W16DCB2	445634093205902	227903	P17	906.2	909.43	94 1/2	1 1/2	0-92 1/2	0-91 1/2 Qd	92 1/2-94 1/2 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W16CDB4	445617093211503	227904	P18	915.1	915.73	42	1 1/2	0-40	91 1/2-94 1/2 Qd	40-42 QM	1 1/2 inches x 2 feet x 8 slot screen
117N21W20ABD2	445554093220302	227905	P19	889.0	890.73	7	1 1/2	0-5	0-7 Qd	3-5 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W20ABD3	445554093220303	227906	P20	889.0	890.11	15	1 1/2	0-13	0-23 Qd	13-15 Wt	Do
PROVISIONAL RECORDS Subject to Revision											
117N21W17AAB2	445654093235502	227907	P21	923.75	923.75	42 1/2	1 1/2	0-40 1/2	0-42 1/2 Qd	40 1/2-42 1/2 Wt	Do
117N21W17ACD1	445637093215701	227908	P22	916.5	918.44	35	1 1/2	0-33	0-36 Qd	33-35 Wt	Do
117N21W17BAC3	445651093222903	227909	P23	896.7	898.71	14	1 1/2	0-12	0-15 Qd	12-14 Wt	Do
117N21W17CAA2	445630093222102	227910	P24	894.4	895.89	14 1/2	1 1/2	0-12 1/2	0-15 Qd	12 1/2-14 1/2 Wt	Do
117N21W17CAD3	445622093221902	227911	P25	890.4	892.21	7	1 1/2	0-5	0-15 Qd	5-7 Wt	Do
117N21W17DCB2	445615093220902	227912	P26	889.4	890.51	4 1/2	1 1/2	0-2 1/2	0-4 1/2 Qd	2 1/2-4 1/2 Wt	Do
117N21W16BDD1	445632093210001	227913	P27	886.8	889.12	17	1 1/2	0-15	0-17 Qd	15-17 Wt	Destroyed
117N21W16CBA1	445631093212001	227914	P28	909.5	911.30	32	1 1/2	0-30	0-42 Qd	30-32 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W18CAD1	445619093232701	227915	P29	906.6	907.31	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
117N21W18DDB1	445618093230501	227916	P30	908.3	910.05	21	1 1/2	0-19	0-21 Qd	19-21 Wt	Do
117N21W18CDA1	445618093233101	227917	P31	909.8	911.59	21	1 1/2	0-19	0-27 Qd	19-21 Wt	Destroyed
117N21W18BDD1	445633093232801	227918	P32	919.5	921.34	28	1 1/2	0-26	0-32 Qd	26-28 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W18DBA1	445631093231101	227919	P33	908.2	909.32	22	1 1/2	0-20	0-22 Qd	20-22 Wt	1 1/2 inches x 2 feet x 40 slot screen
117N21W17BCD1	445634093223501	227920	P34	927.4	929.82	52	1 1/2	0-50	0-52 Qd	50-52 Wt	Do
117N21W17CBD1	445621093223201	227921	P35	923.9	927.54	47	1 1/2	0-45	0-52 Qd	45-47 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W16BBA1	445653093212001	227922	P36	915.3	918.76	47 1/2	1 1/2	0.45 1/2	0-47 1/2 Qd	45 1/2-47 1/2 Wt	Do
117N21W09CAC1	445711093211501	227923	P37	896.1	889.12	16 1/2	1 1/2	0-14 1/2	0-16 1/2 Qd	14 1/2-16 1/2 Wt	Do
117N21W08DAC1	445712093215601	227924	P38	922.2	924.63	48 1/2	1 1/2	0-46 1/2	0-49 Qd	46 1/2-48 1/2 Wt	Do
117N21W08CBD1	445714093223801	227925	P39	904.6	905.64	22	1 1/2	0-10	0-22 Qd	20-22 Wt	Do
117N21W07DDA1	445710083225901	227926	P40	908.7	909.98	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
PROVISIONAL RECORDS Subject to Revision											
117N21W18ABC1	445648093231801	227927	P41	911.6	913.38	21	1 1/2	0-19	0-32 Qd	19-21 Wt	Do
117N21W20ACC1	445546093221301	227928	P42	898.3	899.94	21 1/2	1 1/2	0-19 1/2	0-22 Qd	19 1/2-21 1/2 Wt	Do
117N21W20DBB1	445539093221401	227929	P43	893.4	894.74	14 1/2	1 1/2	0-12 1/2	0-15 Qd	12 1/2-14 1/2 Wt	Do
117N21W20DAA1	445538093214301	227930	P44	895.9	897.04	15	1 1/2	0-13	0-16 Qd	13-15 Wt	Do
117N21W16DCA1	445614093212801	227931	P45	917.8	920.30	41 1/2	1 1/2	0-39 1/2	0-42 Qd	39 1/2-41 1/2 Wt	Destroyed 1 1/2 inches x 2 feet x 10 slot screen

TABLE 1 Continued

PROVISIONAL RECORDS
Subject to Revision

Township and range	Site identification Lat - Long	Minnesota unique well number	USGS project well number	Land surface altitude	M.P. altitude (as of Mar. 1982)	Well depth	Casing diameter (inch)	Casing depth (feet)	Geologic logs	Hydrologic unit Open to well bore (wells screened near water table are designated Wt)	Remarks
PROVISIONAL RECORDS Subject to Revision											
029N24W31DDB1	445716093202001	227932	P46	871.8	873.98	10 1/2	1 1/2	0-8 1/2	0-10 1/2 Qd	8 1/2-10 1/2 Wt	1 1/2 inches x 2 feet x 10 slot screen
028N24W06CAD1	445617093202601	227933	P47	884.6	886.57	21	1 1/2	0-19	0-22 Qd	19-21 Wt	Do
028N24W06BAB1	445651093203601	227934	P48	879.4	881.18	14	1 1/2	0-12	0-22 Qd	12-14 Wt	Do
028N24W07BDC1	445543093203101	227935	P49	907.7	910.17	45	1 1/2	0-43	0-45 Qd	43-45 Wt	Do
028N24W07CDB1	445523093203901	227936	P50	878.4	879.44	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
117N21W21CDB1	445525093211701	227937	P51	899.8	901.54	18	1 1/2	0-16	0-18 Qd	16-18 Wt	Do
028N24W05CDA1	445615093191201	227938	P52	861	863	14	1 1/2	0-12	0-14 Qd	12-14 Wt	Do
029N24W32CCD1	445656093192901	227939	P53	870	872	31	1 1/2	0-29	0-32 Qd	29-31 Wt	Do
028N24W20ADD1	445358093193901	227940	P54	858	860	18	1 1/2	0-16	0-18 Qd	16-18 Wt	Do
029N24W31DAA1	445720093194701	227941	P55	868	871	23 1/2	1 1/2	0-21 1/2	0-28 Qd	21 1/2-23 1/2 Wt	Do
028N24W04AAD1	445642093172501	227942	P56	860	860	47	1 1/2	0-45	0-52 Qd	45-47 Wt	Do
028N24W16ABB1	445510093175301	227943	P57	---	---	12	1 1/2	0-10	0-17 1/2 Qd	10-12 Wt	Do
117N21W20ABD4	445559093220204	227944	P58	890.5	891.46	12	1 1/2	0-10	0-12 Qd	10-12 Wt	Do
117N21W17CAC3	445620093222602	227945	P59	892	893.96	10	1 1/2	0-8	0-12 Qd	8-10 Wt	Destroyed (removed)
029N24W31DAA1	445548093221501	227946	P60	892	894.38	10	1 1/2	0-8	0-10 Qd	8-10 Wt	1 1/2 inches x 2 feet x 10 slot screen
117N21W16CCA1	445617093212001	227947	P61	917.1	921.42	47	1 1/2	0-45	0-47 Qd	45-47 Wt	Do
028N24W07BDB2	445551093203502	227948	P62	909.8	910.40	43	1 1/2	0-41	0-47 Qd	41-43 Wt	Do
117N21W16BCC2	445634093213102	227949	P63	915.9	916.71	46	1 1/2	0-44	0-47 Qd	44-46 Wt	Do
117N21W20AAD3	445555093214502	227950	P64	891.7	892.51	15	1 1/2	0-13	0-15 Qd	13-15 Wt	Do
117N21W21BBB2	445600093213702	227951	P65	901.7	904.11	28	1 1/2	0-26	0-28 Qd	26-28 Wt	Do
117N21W16CDA4	445617093211002	227952	P66	906.1	908.62	41 1/2	1 1/2	0-41 1/2	0-42 Qd	39 1/2-41 1/2 Wt	Do
117N21W21BCD2	445543093212102	227953	P67	913.2	914	21 1/2	1 1/2	0-19 1/2	0-22 Qd	19 1/2-21 1/2 Wt	Do
117N21W16BCC4	445634093213104	227954	P68	915.8	918.45	38	1 1/2	0-36	0-38 Qd	36-38 Wt	Do
117N21W17DBC2	445624093220802	227955	P69	907.1	908.51	24	1 1/2	0-22	0-26 Qd	22-24 Wt	Do
117N21W17CBD2	445621093223202	227956	P100	924.2	925.45	67	1 1/2	0-65	0-67 Qd	65-67 QM	Do
117N21W17CBD3	445621093223203	216200	P101	923.3	925.38	103	1 1/2	0-101	0-98 1/2 Qd	101-103 Op1	Do
117N21W16CCA4	445617093212004	216199	P102	917.1	919.57	107	1 1/2	0-105	98 1/2-103 Op1	105-107 Qb	Screen gravel packed
117N21W17BAC4	445651093223001	216198	P103	895.5	896.38	94	1 1/2	0-73	0-108 Qd	108-109 Op1	1 1/2 inches x 2 feet x 10 slot screen
									0-73 Qd	73-82 Op1	Screen gravel packed
									73-88 Op1		Open hole
									88-90 Op1		
									90-94 Op1		
117N21W17BAC5	445651093223002	216197	P104	895.1	895.84	33	1 1/2	0-31	0-34 Qd	31-33 QM	1 1/2 inches x 2 feet x 10 slot screen
117N21W17BAC6	445651093223003	216196	P105	895.4	896.20	61	1 1/2	0-59	0-61 Qd	59-61 Qb	Do
117N21W17BAC7	445651093222904	216195	P106	896.5	897.02	64 1/2	1 1/2	0-62 1/2	0-65 Qd	62 1/2-64 1/2 Qb	Do
117N21W20AAB2	445605093215102	216194	P109	892.5	892.69	44	1 1/2	0-42	0-44 Qd	42-44 QM	Do
117N21W20AAB3	445605093215102	216193	P110	892.5	892.56	12 1/2	1 1/2	0-10 1/2	0-12 Qd	10 1/2-12 1/2 Wt	Do
117N21W21BBB2	445600093213703	216165	P111	902.0	902.70	78	1 1/2	0-76	0-79 Qd	78-79 Op1	Do
117N21W21BBB3	445600093213704	216166	P112	902.2	903.47	50	1 1/2	0-48	79- Op1	48-50 QM	Do
117N21W21BAD3	445557093210903	216167	P113	915.3	916.88	210	1 1/2	0-201	0-114 Qd	201-207 Op1	1 1/2 inches x 6 feet x 10 slot screen
									207-210 c	114-212 Op1	3-foot casing below screen, cap on end
117N21W21BAD4	445557093210904	216168	P114	915.2	915.62	55	1 1/2	0-53	0-55 Qd	53-55 Wt	1 1/2 inches x 2 feet x 10 slot screen
028N24W06CAD3	445617093202603	216169	P116	885.1	885.08	91 1/2	1 1/2	0-89	0-69 Qd	69-79 Op1	1 1/2 inches x 2 feet x 10 slot screen
									79-80 1/2 Op1		Gravel pack to 10 feet below surface
									80 1/2-91 1/2 Op1		

PROVISIONAL RECORDS
Subject to Revision

443350

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
702 POST OFFICE BUILDING
ST. PAUL, MINNESOTA 55101PROVISIONAL RECORDS
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U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
702 POST OFFICE BUILDING
ST. PAUL, MINNESOTA 55101

PROVISIONAL RECORDS
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TABLE 2. HISTORICAL ST. PETER PAH DATA

Well	Date	Total PAH, ng/l		Lab ^(a)	Document No. or Reference	Analytical Method
		Other PAH	Carcinogenic PAH			
SLP3	11/78	0	0	MDH	475510	HPLC
SLP3	1/29/80	36	30	MDH	6610438	HPLC
SLP3	5/20/80	20	0	MDH	6610438	HPLC
SLP3	7/3/80	0.9	0	MDH	6610438	HPLC
SLP3	1/28/81	0	0	MDH	6610438	HPLC
SLP3	8/11/81	304	0	MDH	96168	HPLC
SLP3	1/15/82	0	0	Capsule	50006352	Resin/GCMS
SLP3	2/21/84	0	0	Pace/RMA	SLP RFQ	Resin/GCMS
SLP3	5/31/84	0	0	Pace/RMA	SLP RFQ	Resin/GCMS
SLP3	6/27/84	0	0	Pace/RMA	SLP RFQ	Resin/GCMS
SLP3	7/25/84	0	0	Pace/RMA	SLP RFQ	Resin/GCMS
SLP3	11/15-28/84	0	0	Pace/RMA	SLP RFQ	Resin/GCMS
W14	5/21/80	1,002	14	MDH	96168	HPLC
W14	12/14/84	514	18	TCT	1/31/85 report	GCMS
W14	12/14/84	0/0 ^(b)	0/0 ^(b)	Acurex	4/5/85 report	cartridge/GCMS
W24	5/21/80	9,855	180	MDH	96168	HPLC
W24	12/10/84	6,165(5,075) ^(c)	27(20) ^(c)	TCT	1/31/85 report	GCMS
W24	12/10/84	1,990/2,090 ^(b)	0/0 ^(b)	Acurex	4/22/85 report	cartridge/GCMS
W33	6/5/79	4.1	6.6	MDH	ERT 1983 report App. B	HPLC
W122	6/26/80	59	31.5	MDH	96168	HPLC
W133	5/30/80	1,765	121	MDH	96168	HPLC
W133	2/6/81	669	65	MRI	800021	HPLC
W133	2/6/81	0	0	MRI	800013	GCMS
W133	12/12/84	3,650	0	Acurex	5/14/85 report	GCMS
P116	5/28/80	0	0	MDH	96168	HPLC

- (a) MRI = Midwest Research Institute
MDH = Minnesota Department of Health
Capsule = Capsule Laboratories
Pace = Pace Laboratories, Inc.
TCT = Twin City Testing, Inc.
RMA = Rocky Mountain Analytical
Acurex = Acurex Corporation

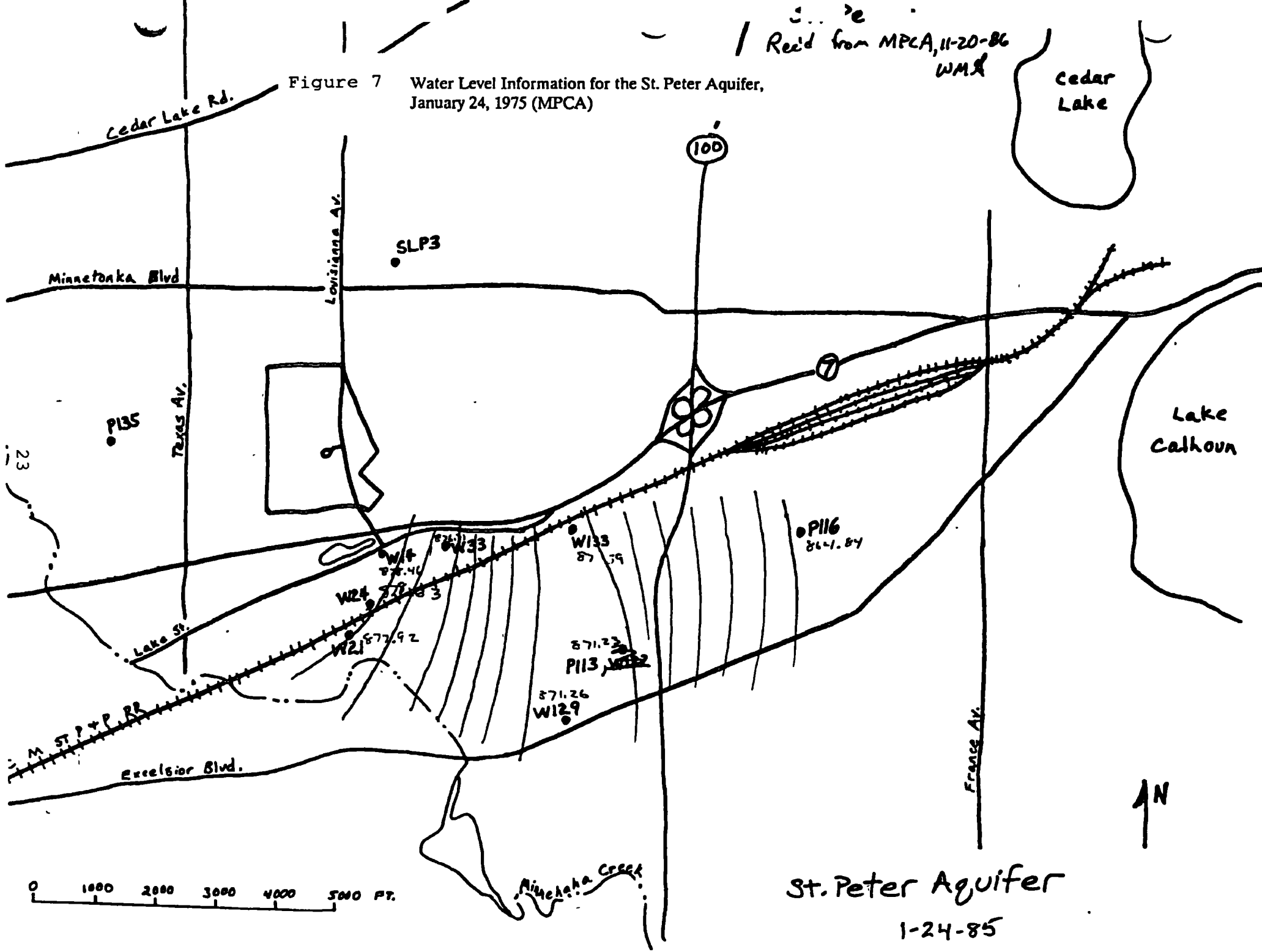
(b) Duplicate samples.

(c) Numbers in parentheses are corrected for field blank.

where is the rest of data? see Fig. 16 + list
W129, W130, W131, W132, W133, W134, W135, W136, W137, W138, W139, W140, W141, W142, W143, W144, W145, W146, W147, W148, W149, W150, W151, W152, W153, W154, W155, W156, W157, W158, W159, W160, W161, W162, W163, W164, W165, W166, W167, W168, W169, W170, W171, W172, W173, W174, W175, W176, W177, W178, W179, W180, W181, W182, W183, W184, W185, W186, W187, W188, W189, W190, W191, W192, W193, W194, W195, W196, W197, W198, W199, W200, W201, W202, W203, W204, W205, W206, W207, W208, W209, W210, W211, W212, W213, W214, W215, W216, W217, W218, W219, W220, W221, W222, W223, W224, W225, W226, W227, W228, W229, W230, W231, W232, W233, W234, W235, W236, W237, W238, W239, W240, W241, W242, W243, W244, W245, W246, W247, W248, W249, W250, W251, W252, W253, W254, W255, W256, W257, W258, W259, W260, W261, W262, W263, W264, W265, W266, W267, W268, W269, W270, W271, W272, W273, W274, W275, W276, W277, W278, W279, W280, W281, W282, W283, W284, W285, W286, W287, W288, W289, W290, W291, W292, W293, W294, 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Rec'd from MPCA, 11-20-86
WMA

Figure 7 Water Level Information for the St. Peter Aquifer,
January 24, 1975 (MPCA)



St. Peter Aquifer

1-24-85

TABLE 3. MPCA ST. PETER WATER LEVEL DATA

DATE	LOCATION	WELL	WATERELE	AQUIFER
1/24/85	4	P 116	864.84	OSTP
1/24/85	9	W 133	871.59	OSTP
1/24/85	11	W 122		OSTP
1/24/85	11	P 113	871.23	OSTP
1/24/85	13	W 129	871.26	OSTP
1/24/85	19	W 21	877.92	OSTP
1/24/85	24	W 14	878.46	OSTP
1/24/85	26	W 33	876.31	OSTP
1/24/85	31	W 24	878.63	OSTP

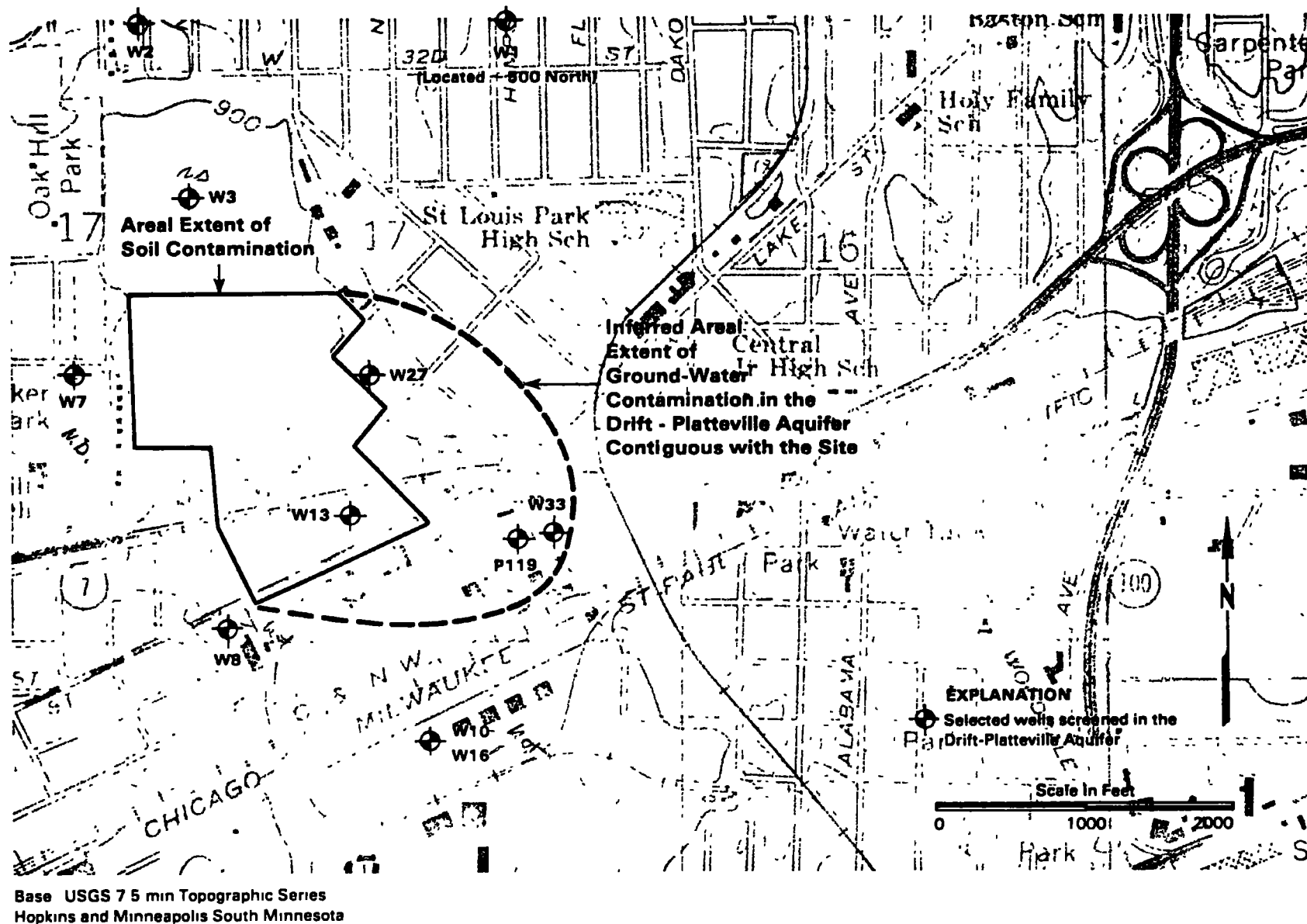
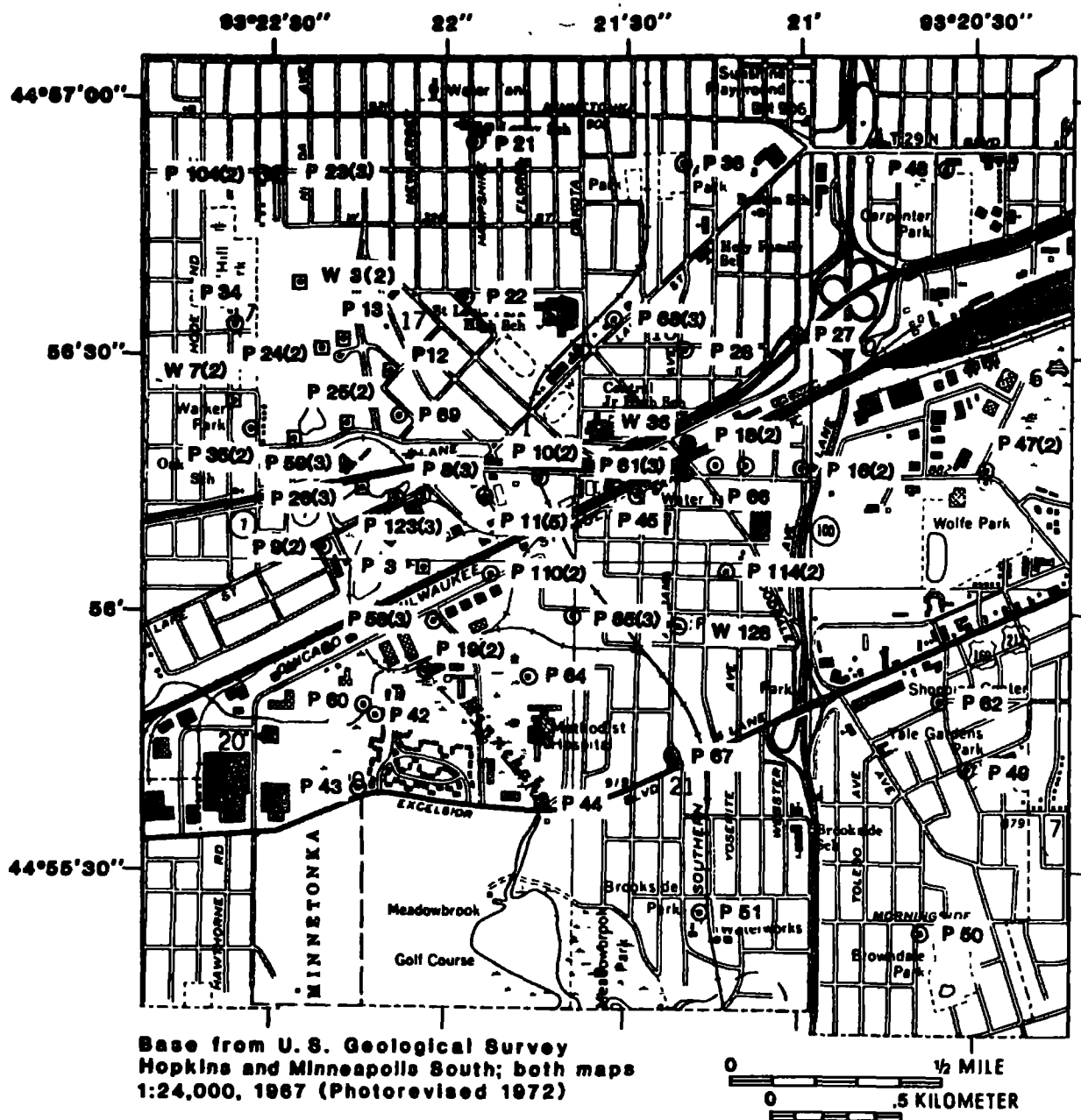


Figure 8. Areal Limits of Soil and Surficial Ground-Water Contamination (ERT, 1983)



EXPLANATION

- P11(5) Location and project well number. At clusters where more than one well is completed in drift, the project well number of the shallowest well is shown and the total number of wells completed in drift at that location is shown in parentheses.
- P59(3) Square indicates that one or more wells at cluster have been permanently sealed, damaged, or destroyed.

Figure 9. Location of Observation Wells Completed in the Drift.



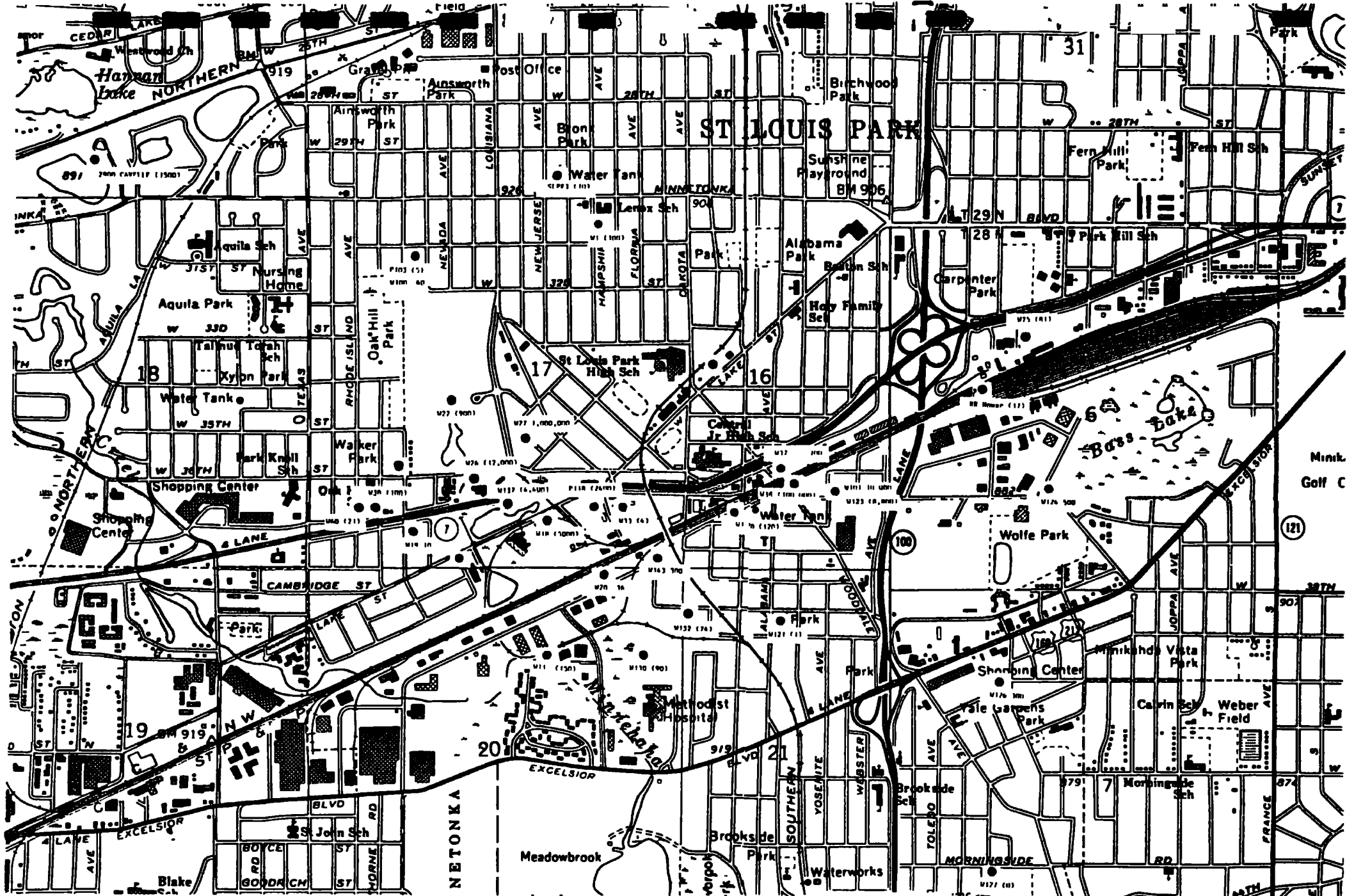


Figure 13 Platteville Aquifer Non-carcinogenic PAH Concentrations



Figure 14 Platteville Aquifer Carcinogenic PAH Concentrations

TABLE 4

RESULTS OF PAH AND PHENOLICS ANALYSES FOR
DRIFT WELLS^(a)

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
P8	05-Jun-80 Map	1,602 (1600)	123 (120)	0	10	(10)	9611321	MDH
P11	02-Jun-80 Map	1,540 (1500)	1,258 (1300)	0	9.5	(10)	9611331	MDH
P14	05-Jun-80	126,730	0	572	8,000		9611341	MDH
P14	Feb-81	10,7000,000 ^(c)				10,700	515700	EHRlich 1982
P14	11-Mar-81	320,000	0	0			800016	MRI
P14	10-Jun-81	300,000	850				6641413	USGS
P14	12-Jan-84			2,000	3,600		9629556	MPCA
P14	17-Jan-84 MAP	300,000	300	2,200	3,500	2,000	9629557	MPCA
P15	04-Jun-80 MAP	654 (650)	71 (70)	360	130	(200)		MDH
P47	28-May-80 MAP	0 (0)	0 (0)	0	2	(2)	9611203	MDH
P50	23-Jun-80 MAP	70 (70)	0 (0)		13	(13)	9611373	MDH
P59	28-Jul-80 MAP	363,580 (360,000)	13,890 (14,000)		6,300	(6,300)	9611376	MDH
P65	26-Jun-80 MAP	71.2 (70)	0 (0)	0	4	(4)	9611380	MDH
P102	30-May-80 MAP	1,353 (1400)	53 (50)	0	8	(8)	9611387	MDH

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
P106	30-Jun-80 MAP	128.5 (130)	13 (13)	0	3.4	(3)	9611316	MDH
P109	26-Jul-80 MAP	-	-		20	(20)	9611286	MDH
P110	02-Jul-80 MAP	773.7 (770)	8.4 (8)	0	0	(0)	9611397	MDH
P111	26-Jun-80 MAP	95.2 (95)	41.8 (40)	0	4.5	(5)	9611401	MDH
P112	27-Jun-80 MAP	79.2 (80)	10.8 (10)	0	9	(10)	9611401	MDH
P117	28-May-80	0	0	0	2.6		9611203	MDH
	01-Sep-83				9.4		9611022	MPCA
	16-Jul-80 MAP	17.4 (17)	12.5 (12)			(6)		MDH
P119	03-Jun-80	2,565	0	0	200		9611413	MDH
	01-Feb-81	2,400,000 (c)		0			515700	EHRLICH 1982
	MAP	1,000,000	0			(200)		
P120	03-Jun-80 MAP	247,822 (250,000)	52 (52)	0	360	(360)	9611415	MDH
P122	12-Jun-80 MAP	4,411 (4,400)	189 (190)	0	7,500	(7,500)		MDH
P123	10-Jun-80 MAP	69,300 (70,000)	14,870 (15,000)	524	7,300	(7,300)	9611426	MDH

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
P124	10-Jun-80	42,520	0	499	3,000		9611430	MDH
	MAP	(43,000)	(0)			(3,000)		
BURN DUMP	23-Dec-83	0	0					MRC
	MAP	0	0			-		
HABCO ^(d)	27-Jun-75					340	7600462	MDH
	MAP	-	-			(340)		
SKIPPY	23-Dec-83	0	0					MRC
	MAP	0	0			-		
W2	12-Apr-76				0		404579	BARR
	25-May-77					0	6100228	MDH
	26-May-77				0		404579	BARR
	29-Mar-79	0	0		5		9402583	MDH
	30-Jun-80	8	12	0	4.4		9611316	MDH
	01-Jun-80					5	515700	EHRlich 1982
	15-Jul-80	73.1	2.5				9611278	MDH
	12-Dec-80	52.1	372.1					MDH
	06-Feb-81	690	0	0			80000	MRI
	09-Sep-82	32	0				534015	CH2M HILL
	07-Nov-82	18	0				534015	CH2M HILL
	MAP	(50)	(10)			(5)		
W3	26-May-77				0		404589	BARR
	MAP					0		
W5	08-Apr-76				153		404579	BARR
	25-May-77					35	6100228	MDH
	26-May-77				22		404579	BARR
	02-Jun-77				28		404579	BARR
	29-Mar-79				9.4		9402559	MDH
	MAP	-	-			(30)		

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
W6	08-Apr-76				43		404579	BARR
	25-May-77					190	6100228	MDH
	26-May-77				88			BARR
	02-Jun-77				50		404579	BARR
	01-Mar-79	12,400,000	1,000,000			100	WSP2211	HULT 1981
	03-Apr-79	1,000,000	1,000,000		93		9402618	MDH
	28-Jul-80				22		9611320	MDH
	MAP	1,000,000	1,000,000			100		
W7	06-Apr-76				0		404579	BARR
	17-Jan-84			170	340		9629557	MPCA
	MAP	-	-			200		
W8	12-Apr-76				0		404579	BARR
	25-May-77					0	6100228	MDH
	26-May-77				0		404579	BARR
	10-Apr-79	5,630	0		9		9402639	MDH
	22-Jul-80	28	14		3.4		9611280	MDH
	MAP	(100)	(14)			9		
W9	01-Apr-76				3,000		404579	BARR
	25-May-77					1,100	6100228	MDH
	26-May-77				600			BARR
	31-May-77	0	0				404788	USEPA (BARR)
	02-Jun-77				600		404579	BARR
	18-Feb-77				760		404579	BARR
	28-Mar-79				110		9402551	MDH
	05-Jun-80(10 MIN)	20,846	0	0	290		9611323	MDH
	05-Jun-80	6,799	600	0	86		9611323	MDH
	19-Jan-84			350	840		9629559	MPCA
	MAP	(10,000)	(200)			(800)		

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
W10	01-Apr-76				0		404579	BARR
	25-May-77					17,000	6100229	MDH
	26-May-77				4		404579	BARR
	01-Mar-79	3,100	0			6	WSP2211	HULT 1981
	05-Apr-79	2,458	0		4.8		9402625	MDH
	23-Jul-80	292	30.4		15.7			MDH
	23-Dec-83	0	0					MRC
	MAP	3,000	(10)			5		
W11	09-Dec-76				22		404579	BARR
	25-May-77					23	6100229	MDH
	26-May-77				4		404579	BARR
	01-Mar-79	4,000	100			4	WSP2211	HULT 1981
	03-Apr-79	4,650	206		3.8		9402618	MDH
	02-Jun-80	1,290	82	0	9		9611336	MDH
	15-Dec-83			2.6	16		9628657	MPCA
	MAP	4,000	200			10		
W12	10-Dec-76				14		404579	BARR
	10-Apr-79	908,260	110		26		9402639	MDH
	04-Jun-80	6,375	64	0	36		9611282	MDH
	25-Jun-80	2.3	0	0	3.8			MDH
	01-Jul-80					400	515700	ENRlich 1982
	10-Oct-83	60,000	0					MRC
	MAP	10,000	(20)			100		
W15	25-May-77					37	6100229	MDH
	26-May-77				28		404579	BARR
	23-Jul-80	111.2	5		6.6			MDH
	28-Jul-80	1,337	184		14			MDH
	MAP	(1,000)	(100)			(20)		

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
W16	19-Apr-77				2		404579	BARR
	25-May-77					0	6100229	MDH
	26-May-77				4		404579	BARR
	01-Mar-79	100	0			0	WSP2211	HULT 1981
	05-Apr-79	210	0		0		9402625	MDH
	23-Jul-80	13.6	0		2.7		9611327	MDH
	23-Dec-83	0	0					MRC
	MAP	100	0			(4)		
W17	19-Apr-77				280		404579	BARR
	25-May-77					340	6100230	MDH
	26-May-77				140		404579	BARR
	31-May-77	1,700,000 ^(c)	0					USEPA
	02-Jun-77				180		404579	BARR
	22-Jun-77				32		404579	BARR
	01-Mar-79	5,000	0			200	WSP2211	HULT 1981
	03-Apr-79	14,510	0		240		9402618	MDH
	02-Jun-80	3,733	0	0	300		9611345	MDH
	16-Jan-84			180	300		9628658	MPCA
	MAP	100,000	0			250		
W25	25-May-77				35		6100228	MDH
	MAP	-	-			(35)		
W59	15-Feb-80	47,000	12,600		31		9201273	MDH
	MAP	(47,000)	(13,000)			(31)		
W65 ^(e)	08-Feb-79	28,192	331.7		3.8		7200360	MDH
	09-Feb-79	2,725.2	422.8					MDH
	01-Jul-83	500	0			0		MRC
	10-Oct-83	400	0					MRC
	MAP	3,000	(350)			(2)		

Well Number	Sample Collection	PAH in parts per trillion		Phenolics in parts per billion			Document Number	Data Source
		Non-Carcinogenic	Carcinogenic ^(b)	GC/MS	MBTH/4 AAP	Method Unknown		
W116	17-Apr-79	11,900	0		2.6		4402658	MDH
	23-May-80	803	313		5		9611407	MDH
	01-Feb-81	0	0	0			800013	MRI
	06-Sep-83				20		9611021	NPCA
	MAP	(1,000)	(80)			(5)		
W117	01-Jan-79	4,900	0				6641413	USGS
	10-Apr-79	908,170	110		26		9402639	MDH
	17-Apr-79	61,800	0		20		4402658	MDH
	23-May-80	760	0		15		9611409	MDH
	01-Jul-80	0	0			10	515700	EHRlich 1982
	16-Jul-80	3.4	10					MDH
	11-Mar-81	13,410	48.1		11		6640329	MDH
	11-Feb-81	3,000	0	0			800000	MRI
	06-Sep-83				30		9611021	NPCA
	01-Oct-83	30,000	0					MRC
	10-Oct-83	40,000	0					MRC
	02-Dec-83			9.8	41		9628655	NPCA
	MAP	40,000	(10)			30		
W128	25-May-77				56,000		6100229	MDH
	MAP	-	-			(56,000)		
W134	01-Dec-83			28	30		9628654	NPCA
	MAP	-	-			30		
W135	25-Jun-80	5.3	0	0	4.8		9611444	MDH
	MAP	(5)	(0)			(5)		
W136	07-Dec-83			21	11		9628656	NPCA
	MAP	-	-			15		

- a. All results reported as below detection limits are counted as zero. The detection limits varied considerably for PAH (tenths of a part per trillion to tenths of parts per million), but were generally 2 parts per billion for most phenolics analyses (MDH lab MBTH method).
- b. Carcinogenic PAH include benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, dibenzo(a,e)pyrene, dibenzo (a,h)pyrene, dibenzo(a,i)pyrene, 7,12-dimethylbenz(a)anthracene, indeno(1,2,3-cd)pyrene, and 3-methylcholanthrene.
- c. Individual PAH were not identified, only a total PAH reported with no indication of carcinogenic fraction.
- d. Sample was collected from the water table at a depth of four feet. there was no indication on the data sheet that the sample came from a well.
- e. W65 is a Platteville-St. Peter well according to Hult, 1981. However in 1983 this well was only 57 feet deep, so it is assumed to now draw water from holes in the casing adjacent to the drift.

TABLE 5 RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATTEVILLE WELLS^(a)

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC ^(b)	GC/MS	MBTH/4AAP	METHOD UNKNOWN		
03	01-Jul-80 MAP	5.00 (5)	4.30 (4)	0.00	0.00 (0)		9611313	MDH
18	03-Jun-80 MAP	2,445.00 (2400)	0.00 (0)	0.00	92.00 (92)		9611412	MDH
21	12-Jun-80 MAP	--	--		18.00 (18)			MDH
00 CAVELLE ^(c)	15-Jan-80	1,526.70	187.50			0.00	9200675	MDH
00 CAVELLE	Jul-83 MAP	100.00 (1500)	0.00 (190)		0.00 (0)			MRC
1 SWITCH HOUSE	07-Jul-81 MAP	16.60 (17)	3.70 (4)		0.00 (0)			MDH
LP#1 ^(c)	18-Sep-73					35.00	1000163	MDH
LP#1	25-Sep-73					0.00	50000353	MDH
SLP#1	04-Dec-73					13.00	6600130	MDH
LP#1	03-Jan-74					0.00	1000149	MDH
LP#1	08-Jan-74					3.00	1000145	MDH
SLP#1	16-Jan-74					0.00	1000143	MDH
SLP#1	22-Jan-74					9.00	1000137	MDH
LP#1	30-Jan-74					0.00	1000135	MDH
LP#1	05-Feb-74					7.00	6400095	MDH
SLP#1	25-Aug-75 MAP	--	--		(10)	0.00	544069	MDH
SLP#3 (W113) ^(c)	18-Sep-73					0.00	1000163	MDH
SLP#3 (W113)	04-Dec-73					2.00	6600130	MDH
SLP#3 (W113)	03-Jan-74					5.00	1000149	MDH
SLP#3 (W113)	08-Jan-74					6.00	1000145	MDH
SLP#3 (W113)	16-Jan-74					0.00	1000143	MDH
SLP#3 (W113)	22-Jan-74					4.00	1000137	MDH
SLP#3 (W113)	30-Jan-74					0.00	1000135	MDH
SLP#3 (W113)	05-Feb-74					0.00	6400095	MDH
SLP#3 (W113)	17-Jul-74					0.00	6600075	MDH
SLP#3 (W113)	25-Aug-75					16.00	544069	MDH
SLP#3 (W113)	19-Oct-77					0.00	6002166	MDH
SLP#3 (W113)	29-Jan-80	36.00	30.00				6610310	MDH
SLP#3 (W113)	21-May-80	20.00	0.00				6640144	MDH
SLP#3 (W113)	03-Jul-80	0.94	0.00					MDH
SLP#3 (W113)	28-Jan-81	0.00	0.00				6646363	MDH
SLP#3 (W113)	19-Jan-83 MAP	0.00 (10)	0.00 (6)				9611786	MDH

RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATEVILL WELLS

WELL NUMBER	COLLECTION DATE	SAMPLE		PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)		METHOD	DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	UNKNOWN				
M1	12-Apr-76	404579	0.00	0.00	0.00	0.00	0.00	0.00	404579	BARR
M1	26-May-77	404579	0.00	0.00	0.00	0.00	0.00	0.00	404579	BARR
M1	29-Mar-79	70.00	0.00	0.00	0.00	0.00	0.00	0.00	9402559	MDH
M1	01-Jul-80	13.50	5.80	0.00	0.00	0.00	0.00	0.00	9611313	MDH
M1	06-Feb-81	450.00	0.00	0.00	0.00	0.00	0.00	0.00	800000	MRI
M18	29-Mar-79	47,620.00	0.00	73.00	100.00	9402553	MDH	MDH	MDH	MDH
M18	10-Jun-80	(23 MIN)	5,127.00	0.00	0.00	0.00	0.00	0.00	9611348	MDH
M18	10-Jun-80	(45 SEC)	536.00	0.00	0.00	0.00	74.00	150.00	9629558	MDH
M18	18-Jan-84	MAP	(5000)	(10)	10	10.00	0.00	0.00	9611350	MDH
M19	Mar-79	12.50	6.00	5.30	10.00	MSP2211	MDH	MDH	MDH	MDH
M19	21-Mar-79	9.90	5.30	10.00	0.00	9402757	MDH	MDH	MDH	MDH
M19	23-Jul-80	1.40	0.00	0.00	0.00	9611352	MDH	MDH	MDH	MDH
M20	Mar-79	36.80	4.00	34.00	40.00	MSP2211	MDH	MDH	MDH	MDH
M20	21-Mar-79	36.00	4.18	36.00	36.00	9402757	MDH	MDH	MDH	MDH
M20	26-Jul-80	MAP	36	4	36	9611352	MDH	MDH	MDH	MDH
M22	29-Mar-79	890.00	0.00	0.00	0.00	9402553	MDH	MDH	MDH	MDH
M22	25-Jul-80	75.50	10.10	0.00	0.00	9611284	MDH	MDH	MDH	MDH
M26	17-Apr-79	12,220.00	40.00	2.20	22.00	9402664	MDH	MDH	MDH	MDH
M26	26-Jul-80	MAP	(12000)	(40)	(22)	9611356	MDH	MDH	MDH	MDH
M27	17-Jul-79	7,995.00	0.00	52.00	9402761	MDH	MDH	MDH	MDH	MDH
M27	25-Jul-80	2,362.00	20.00	180.00	9611358	MDH	MDH	MDH	MDH	MDH
M27	Jul-83	6,000,000.00	0.00	26,000.00	MAP	10-Oct-83	1,230,000.00	0.00	0.00	0.00
M27	10-Oct-83	MAP	1000000	0	2600					
M30	03-Jan-70	0.00	0.00	0.00	0.00	9611878	MDH	MDH	MDH	MDH
M30	03-Jan-74	0.00	0.00	0.00	0.00	640080	MDH	MDH	MDH	MDH
M30	08-Jan-74	4.00	4.00	50000342	9611878	MDH	MDH	MDH	MDH	MDH
M30	16-Jan-74	0.00	0.00	0.00	0.00	50000342	MDH	MDH	MDH	MDH
M30	05-Feb-74	0.00	0.00	0.00	0.00	9611878	MDH	MDH	MDH	MDH

**RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATTEVILL WELLS**

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	METHOD		
						UNKNOWN		
W30	26-Apr-79	70.00	1.30			0.00	9200714	MDH
W30	14-May-79	189.40	10.30			5.80	9200726	MDH
W30	26-Apr-80	70.00	1.30			5.80	9611881	MDH
	MAP	(100)	(8)			(4)		
W33 (c)	18-Dec-73				1,000.00		9611886	MDH
W33	27-Dec-73				1,200.00		9611886	MDH
W33	03-Jan-74				1,200.00		9611886	MDH
W33	08-Jan-74				1,000.00		9611886	MDH
W33	16-Jan-74				1,100.00		9611886	MDH
W33	22-Jan-74				1,200.00		9611886	MDH
W33	30-Jan-74				1,100.00		9611886	MDH
W33	05-Feb-74				1,100.00		9611886	MDH
W33	22-May-74				620.00		9611886	MDH
W33	11-Nov-74				1,100.00		9611886	MDH
W33	01-Apr-76				170.00		404579	BARR
W33	26-May-77				140.00		404579	BARR
W33	26-May-77				390.00		404579	BARR
W33	10-Jul-78					22.00	7366666	MDH
W33	05-Jun-79	4.10	9.10		220.00		9200709	MDH
	MAP	(4)	(9)		(1400)			
W37	Jan-79	902.50	0.00		10.00		WSP2211	MULTI USE
W37	08-Feb-79	862.20	0.00		11.00		7200360	MDH
	MAP	900	0		10			
W38 (c)	09-Jan-80	42,460.00	10,650.00			11.60	9200730	MDH
W38	07-Apr-80 (1110) (d)	6,040.00	478.00		2.80		9201261	MDH
W38	07-Apr-80 (1505)	28,600.00	2,463.00		2.20		9201261	MDH
W38	07-Apr-80 (1237)	116,100.00	15,150.00				9201260	MDH
	MAP	(100000)	(10000)		(10)			
W60 (c)	13-Jun-79	20.50	28.70			4.80	9200730	MDH
	MAP	(21)	(29)			(5)		
W75 (c)	22-May-79	80.80	2.40			0.00	9200705/7200245	MDH
	MAP	(81)	(2)			(0)		
W100	Jan-79	61.80	1.00			0.00	WSP2211	MULTI USE
W100	21-Mar-79	65.00	1.65			0.00	9402754	MDH
W100	29-Mar-79				0.00		9402585	MDH
W100	30-Jun-80	6.70	0.00		7.00		9611316	MDH
W100	15-Jul-80	1.00	3.90				9611382	MDH
W100	08-Dec-80	6,050.00	100.20				9611588	MDH
W100	09-Sep-82	0.00	0.00				534013	CH2M HILL

**RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATTEVILL WELLS**

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE	
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	METHOD			
						UNKNOWN			
100	08-Nov-82 MAP	19.20 60	2.50 (4)			(7)	534013	CH2M HILL	
101	Jan-79	1,041.00	1.00				20.00	WSP2211	HULT 1981
W101	21-Mar-79	848.30	0.90		14.00			9402504	MDH
W101	17-Apr-79				14.00			9402667	MDH
101	23-May-80	986.00	200.00		27.00			9611386	MDH
101	16-Jul-80	1,801.00	0.00						MDH
W101	06-Feb-81	5,540.00	0.00	0.00				800000	MFI
101	Jul-83	80,000.00	0.00		6,000.00				MRC
101	06-Sep-83				26.00			9611021	MPCA
W101	10-Oct-83 MAP	20,000.00 10000	0.00 0			26			MRC
115	Jan-79	161.00	0.00				10.00	WSP2211	HULT 1981
W115	21-Mar-79	138.00	0.00				9.00	9402754	MDH
115	17-Apr-79				9.00			9402667	MDH
115	23-Jul-80 MAP	111.20 (150)	5.00 (5)		6.60 10			9611328	MDH
1120	29-May-80 MAP	119.00 (120)	0.00 (0)		41.00 (41)			9611300, 9611298	MDH
1121	26-Jun-80 MAP	1.10 (1)	0.00 (0)		3.20 (3)				MDH
1123	23-May-80	8,795.00	0.00		14.00			9611425	MDH
1123	07-Sep-83 MAP				32.00 30			9611020	MPCA
1124	22-May-80	21,030.00	813.00		5.00			9611429	MDH
W124	16-Jul-80	4.69	0.00						MDH
W124	06-Feb-81	0.00	0.00	0.00				800000	MFI
W124	06-Feb-81	485.00	51.00					800000	MFI
W124	06-Sep-83				0.00			9611022	MPCA
W124	10-Oct-83 MAP	0.00 500	0.00 51			(2)			MRC
W126	24-Jun-80	9.60	1.60	0.00	5.80			9611433	MDH
W126	10-Oct-83 MAP	300.00 300	0.00 0			(6)			MRC
W127	23-Jun-80 MAP	0.00 (0)	0.00 (0)	0.00	13.00 (10)			9611435	MDH

**RESULTS OF PAH AND PHENOLICS ANALYSES FOR
PLATTEVILL WELLS**

WELL NUMBER	SAMPLE COLLECTION DATE	PAH RESULTS (PPT)		PHENOLICS RESULTS (PPB)			DOCUMENT NUMBER	DATA SOURCE
		NON-CARCINOGENIC	CARCINOGENIC	GC/MS	MBTH/4AAP	METHOD UNKNOWN		
30	01-Jul-80 MAP	89.90 (90)	0.00 (0)	0.00	5.60 (3)		9611313	MDH
31	15-Dec-83 MAP	--	--	28.00	37.00 (30)		9828657	MDH
32	27-Jun-80 MAP	74.00 (74)	0.00 (0)	0.00	12.00 (6)		9611449	MDH
37	12-Jun-80 MAP	4,411.00 (4400)	189.00 (190)		2.70 (3)			MDH
W143	25-Jul-80	58.10	7.00		2.60		9611447	MDH
43	10-Oct-83 MAP	300.00 300	0.00 (7)		(3)			MRC

- a. All results reported as below detection limits are counted as zero. The detection limits varied considerably for PAH (tenths of a part per trillion to tenths of parts per million), but were generally 2 parts per billion for most phenolics analyses (MDH lab MBTH method).
- b. Carcinogenic PAH include benz(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, dibenzo(a,e)pyrene, dibenzo(a,h)pyrene, dibenzo(a,i)pyrene, 7,12-dimethylbenz(a)anthracene, indeno(1,2,3-cd)pyrene, and 3-methylcholanthrene.
- c. These wells are multi-aquifer wells that probably yielded some unknown fraction of their total discharge from the Platteville aquifer.
- d. Evidently, time series sampling was done, however the starting time for pumping is not indicated on the data sheets.

NON-RESPONSIVE

0 500 1000

Proposed
Figure 15 Location of _p Source and Gradient Control Wells

Multi-aquifer Wells

W23 ✓
Wells that are hydraulically connected (e.g., via screens, open bore holes, un-grouted casings, or through holes in casings) to more than one aquifer have been determined to play a significant role in the migration of contaminants into the Prairie du Chien-Jordan Aquifer in St. Louis Park. (However, previous studies have not been able to demonstrate a significant role of multi-aquifer wells in allowing contaminants to migrate into the St. Peter Aquifer.) The U.S. Geological Survey (USGS, Water Supply Paper 2211, 1984) investigated a number of suspect wells and "No flow was detected" entering the St. Peter Aquifer, despite downward hydraulic pressures. In summary, the USGS suggested that "More observation wells will be needed to clearly evaluate whether or not Platteville-St. Peter multi-aquifer wells have had a measurable effect on the quality of water in the St. Peter aquifer". Of the many multi-aquifer wells that have been identified in previous studies (Tables 6 and 7) many have been sealed or reconstructed, including all known multi-aquifer wells connecting the St. Peter Aquifer with overlying contaminated portions of the Drift-Platteville Aquifer (Figure 8), except well W23. *no data - conflict with*
state of
is this true? - how about RAP to J.D.

W23 ✓
Well W23 will be reconstructed as part of the RAP implementation. The possible significance of well W23 in the distribution of contaminants in the St. Peter *is addressed* in this work plan and will be evaluated during the present investigation. *no it is not*

History of Response Actions

A summary of previous response actions conducted by local, state, federal, and private parties, including site inspections and other technical reports and their results is included in Appendix A. Enforcement activities taken to identify responsible parties, compel private cleanup, and recover costs are summarized. A list of reference documents that currently exist in the public domain is included. The scope of this investigation addresses the problems and questions that have resulted from previous work at the site.

Boundary Conditions and Site Map

- ✓ The area of investigation is defined by historical water quality data for St. Peter monitoring wells, the current use of the aquifer for potable supply, and by the general area of Drift-Platteville contamination. This area lies within the boundaries of St. Louis Park and is covered by many of the maps provided previously (e.g., Figures 1, 5, and 7). *will be def - by this*

TABLE 6
MULTI-AQUIFER WELLS IDENTIFIED BY USGS, MDH AND MPCA

Well Number	Well Name	Aquifers Open to Well(s)					Status (b)	Source (c)	Remarks
		Drift- Platteville	St. Peter	Prairie du Chien-Jordan	Yronton- Galesville	Mt. Simon- Hinckley			
<u>Deep Wells</u>									
W29	Flame Industries	X?	X?	X?			P	H,M,U	1976 in minor use
W32	Texatanka Shopping Ctr.			X			L	H,U	
W34	Crib Diaper Service			S			SM,G	H,U	
W35	Burdick Grain Co.	X?	X?	X			MW;P	H,H,U,MPCA	
W38	Milwaukee RR Well	S	S	S	X	S	MW	H,U,UE	
W40	Minnesota Rubber			X			P	H,M,U	1976 in active use
W43	S&K Products, Inc.		X	X			P	H,M,U	
W46	S&K Products, Inc.		X	X			P	H,M,U	1976 in minor use
W47	Belco; Burdick Grain	S		S			S;G	U,H	
W49	Strom Block Co.		X	X			-	H,M,U	
W50	Prestolite		S	S	S		SM;G	U	
W62	McCourtney Plastics		X	X			P	H,M,U	
W66	Black Top Service	X?	X?	X?			RF	H,U	deep well
W69	Hedberg-Friedheim	S	S	S			SM;G	H,U	Wolfe Lake
W70	Park Theatre			X			P	H,U	
W74	Landers Gravel	X?	X?	X			RS	S,U	
W105	Minn. Sugar Beet	X	X	X		X?	-	H,U	under study by Hickok, 1983
W107	Interior Elev.	X?	X	X	X		-	H,U	
W112	Old SLP #1			X			MW;G	H,U	Old St. Louis Park Well SLP #1
W114	Hedberg-Friedheim	S	S				SM	U	

TABLE 6 (Continued)

Well Number	Well Name	Aquifers Open to Well ^(a)					Status ^(b)	Source ^(c)	Remarks
		Drift- Platteville	St. Peter	Prairie du Chien-Jordan	Ironton- Galesville	Mt. Simon- Winckley			
<u>Shallow Wells</u>									
W27	Terry Excavating	X	S				MW;G	H,U	11 Oct 79 St. Peter sealed
W30	3636 Quebec	S	S				SM	H,U	
W33	Strand Mfg.	S	X				P; MW; G	H,U	11 Oct 79 Platteville sealed
W37	Dayton Rogers #2	X	X				MW;G	H,U	
W41	Hartman #1	X	X				O	M	
W44	Kings Inn	X	X				P	H,U	
W52	Merit Gauge	S	S				SM; G	H,U	
W60	3645 Rhode Island	S	S				SM	H,U	
W61	W.V. Terry,						-	H,U	No Data
W65	Ace Mfg.	X	X				L	H,U	
W67	Black Top Service	X?	X				-	H,U	Shallow Well
W75	Park Pet Hospital	X	X				P	H,U	
W76	Professional Instru.	X?	X				P	H,U	
W106	Hedberg-Friedheim	X?	X				-	H,U	
W113	SLP #3	X	X				P	H,U	St. Louis Park Well SLP #3

(a) Aquifer Legend

X, aquifer presently open to well; X?, aquifer probably open to well; S, aquifer no longer open to well.

(b) Status Legend

D, destroyed; O, obstructed; L, located; P, located with pump; S, sealed; RS, reportedly sealed;

SM, sealed by MDR; MW, reconstructed as monitoring well; RF, reportedly filled; G, geophysically logged.

(c) Source Legend

H, Hult (1979); U, Hult and Schoenberg (1981); M, Minnesota Department of Health (1979-1981); UE, USGS-ERT meeting of April 1980; MPCA, Minnesota Pollution Control Agency (1982).

TABLE 7
OTHER POSSIBLE MULTI-AQUIFER WELLS

Well Number	Well Name	Aquifers Open to Well					Status ^(a)	Source ^(b)	Remarks
		Drift- Platteville	St. Peter	Prairie du Chien-Jordan	Ironton- Galesville	Mt. Simon- Hinckley			
W39	3612 Alabama		X				D	U	
W48	Methodist Hospital		X	X			P; G	U	also screened in St. Lawrence Form. 285' deep
W63	National Foods			X			P	U	
W72	Harder Res.		X				-	U	
W73	Jasperson Dairy	X	X				-	U	
W80	Red Owl			X			-	U	
W82	Weldwood Nursing	X?	X?	X?			-	U	
W86	Prudential #1			X			-	U	also screened in St. Lawrence Form.
W104	Rice Sand & Gravel			X?			-	U	
W109	Max Renner's Shop	X?	X				-	U	
W111	6030 Oxford		X				L; G	U	
W118	Golf Course			X			RS	U	also screened in St. Lawrence Form.
W119	Golf Course			X			-	U	also screened in St. Lawrence Form.

^(a) Status Legend

D, destroyed; O, obstructed; L, located; P, located with pump; S, sealed; RS, reportedly sealed;
SM, sealed by MDH; MW, reconstructed as monitoring well; TS, temporarily sealed; RF, reportedly
filled; G, geophysically logged.

^(b) Source Legend

H, Hult (1979); U, Hult and Schoenberg (1981); M, Minnesota Department of Health (1979-1981);
DE, USGS-ERT meeting of April 1980.

TASK 2 PLANS AND MANAGEMENT

This section describes the location and design of the five St. Peter Aquifer monitoring wells to be installed for this investigation. A detailed sampling plan is described in a separate document that describes all ground-water monitoring to be done in accordance with the RAP. Section B of this document describes relevant data management plans for the project. Section C contains the Health & Safety Plan, and Section D is the Community Relations Plan for this project.

Well Locations

Figure 16 shows the proposed locations for the five new monitoring wells and the locations of existing St. Peter Aquifer wells (SLP3, W14, W24, W33, W122, W129, W133, and P116) that will be monitored during this investigation. Since 1979, samples from the existing St. Peter Aquifer wells have been subjected to a limited number of PAH analyses (Table 2). The historical data generally show elevated PAH concentrations at W14, W24, and W133. Relatively low PAH concentrations at the other wells, including W33, indicate that there may be separate eastern and western areas of contamination in the St. Peter Aquifer, rather than one continuous contaminant plume. *delrin screen 102-112'*

The five new monitoring well locations were chosen to enhance the existing monitoring well network, with particular emphasis placed on potential contaminant sources to the St. Peter Aquifer at well W23 and at the bog area south of the Reilly site. In the bog area, the Drift-Platteville Aquifer is known to be contaminated, and potential contaminant migration pathways to the St. Peter Aquifer exist (or existed) in the form of a bedrock valley and multi-aquifer wells. Also, wells W24 and W14 have shown elevated PAH concentrations in the past. Well W23 is considered a potential source of contamination to the St. Peter Aquifer because of its history of contamination in the Prairie du Chien-Jordan aquifer. Monitoring wells B and C are positioned to investigate these two potential source areas, while the remaining three wells are located at greater distances from the source, to the north, south, and east (crossgradient and downgradient from the potential sources).

Based on the locations of possible sources of contamination to the St. Peter Aquifer, the historical water quality data, the ground-water flow pattern, and on the current distribution of monitoring wells in the St. Peter Aquifer, the following rationale is given for the locations of the five new monitoring wells:

Well A - Located mid-way between the site area and municipal well SLP3. It is anticipated that this location will monitor the northern fringes of ground water flowing east from the site and could serve as an early warning for contaminants migrating from the site area toward SLP3. *has 23 PAH*

44°57'00"

92

5' 3)

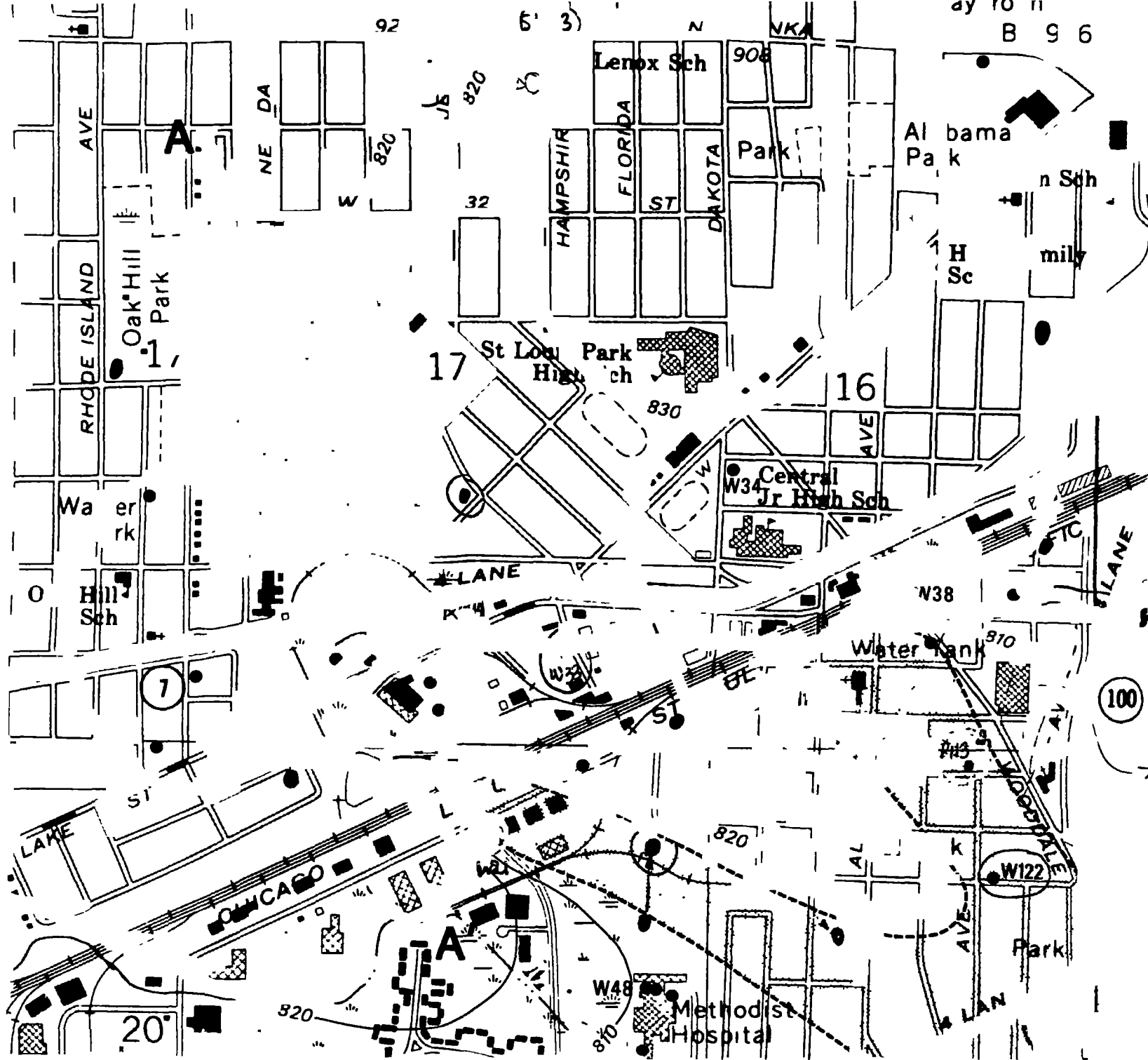
N

NKA

B 9 6

56°30"

44° 56'00"



Base from U.S. Geological Survey
Hopkins and Minneapolis South; both maps
1:24,000. 1967 (Photorevised 1972)

St. Peter

NON-RESPONSIVE

Figure 16 Proposed and Existing Well Locations and Bedrock Valley

Well B - Located near Republic Avenue and 2nd Street NW. This location will monitor ground water flowing downgradient from the site and from potential contaminant sources at multi-aquifer wells W23 and W27.

Well C - Located near Edgewood Avenue and Oxford Street. This location will monitor ground water flowing downgradient of the site bog area and a bedrock valley. Well W24 has indicated elevated PAH concentrations in the bog area in the past.

Well D - Located just north of Methodist Hospital. This monitoring point will determine if contaminants detected at well W24 have migrated this far south. u/a ESE flow may not be representative - part on N. edge of b.v. 300's on E of

Well E - Located near 36th Street and Webster Avenue. This location will monitor ground water downgradient from the area of elevated PAH concentrations previously measured at well W133. ESE flow - move bet W133 & W113 due s. of b.v.

The well designations A, B, C, D, and E will be changed to project numbers using the USGS numbering system upon concurrence of all Project Leaders. All wells will be located on City-controlled property, and St. Louis Park will make all necessary arrangements for access requirements.

Well Design and Installation

Figure 17 shows the general monitoring well design details. The well design shown in Figure 17 will allow for the collection of samples that will consist of water contributed from four zones within the St. Peter Aquifer, and will therefore account for water quality stratification in the aquifer. A combination of cable tool and mud rotary drilling techniques will be used to construct the monitoring wells. The sequence of well construction activities will be:

1. Mobilization and set-up cable tool rig.
2. Drill and drive 14-inch diameter schedule 40 steel casing from the ground surface to the top of the Platteville Formation (approximately 70 feet).
3. Drill nominal 14-inch diameter open hole through Platteville Formation and approximately 2 feet into the Glenwood Shale confining bed (approximately 22 feet).
4. Install 8-inch diameter schedule 40 steel casing leaving a one to two foot stick up above grade, and grout into place (approximately 94 feet of 8-inch pipe).

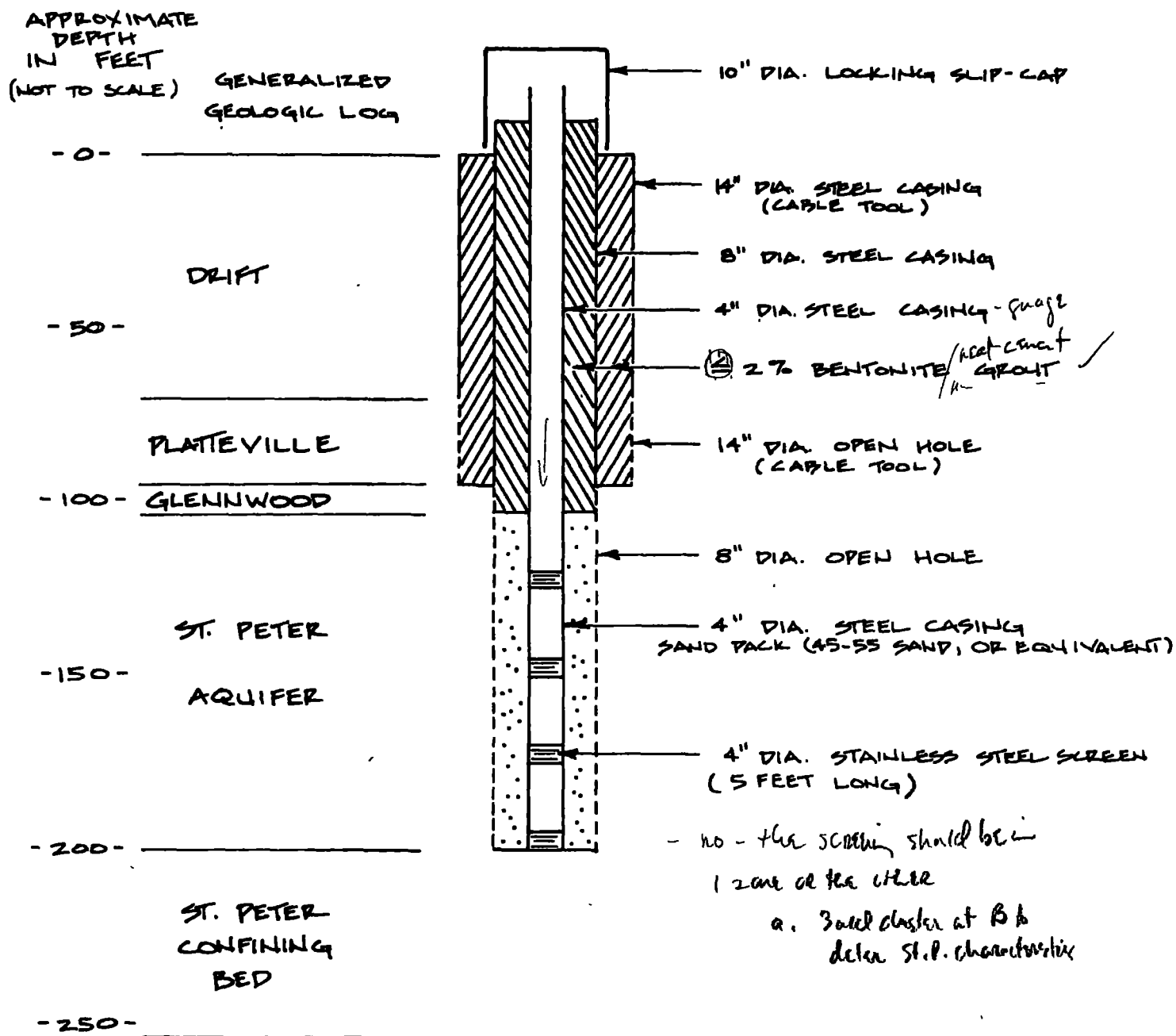


Figure 17. General Monitoring Well Design

5. Replace cable tool rig with direct rotary rig.
6. Drill nominal 8-inch diameter hole to the top of the basal St. Peter confining bed (approximately 108 feet).
7. Install 4-inch diameter schedule 40 steel casing with 5-foot long stainless steel screens positioned at depths of 195 to 200 feet, 170 to 175 feet, 145 to 150 feet, and 115 to 120 feet. Leave a two-foot stick-up above grade (approximate 202 total feet, 20 feet of screen). The screen slot size will be determined by the City's field representative based on conditions encountered in the field. *sure about*
8. Place sand pack around screened intervals. Use Eau Claire 45-55 or Unimin 20-40 or equivalent. Sand pack will extend from roughly 100 feet to 200 feet. Place 2-foot bentonite seal above sand pack. *no. of machines injected*
9. Develop well using high velocity jetting techniques and clean water.
10. Grout 4-inch casing and construct well head using a locking slip cover as illustrated in Figure 17.

Using cable tool techniques for the first few tasks will enable drilling through the Platteville Formation without concern for the possible loss of circulation which could hinder mud rotary drilling. Mud rotary is necessary to ensure the St. Peter will remain open and allow the placement of the windowed well screen and sand pack. (Proper development of each well will consist of a high velocity jetting technique that will effectively remove the mud cake from the borehole.) *intod into to st. p.*

The licensed well contractor will perform the drilling and well construction procedures. *all w/ casing pipe* Casings will be grouted into place from the inside-out. Any additional grout that may be required (e.g., due to grout loss in the Platteville when grouting the 8-inch casing) will be installed with a tremie pipe. All grout and other material specifications will conform with the requirements of the Minnesota Water Well Construction Code and are left to the discretion of the well contractor. Disinfectants will not be used, as they may interfere with subsequent water quality analyses. *what about mud characteristics*

The five drilling sites are in residential areas and will therefore be kept neat and clean at all times. Any water produced from well development or purging will be directed to the sanitary sewer. Drilling fluids, cuttings, and other debris will be containerized and disposed of according to applicable regulations at the direction of the City's field representative, and in accordance with the Contingency Plan. Drilling tools and equipment will be cleaned appropriately between wells. A record containing documentation of these procedures, field notes, well logs, measurements, etc. will be maintained. *after permit*

is included in the report
again for final approval
 55

Contingency Plan

This Contingency Plan outlines the course of action that will take place if contaminated materials are encountered during the installation of St. Peter Aquifer monitoring wells. In conjunction with the approval of this St. Peter RI Plan and this Contingency Plan, the City shall petition the United States Environmental Protection Agency for issuance of a proper identification number as a licensed (small) generator of hazardous waste. Further, upon receipt of the United States Environmental Protection Agency identification number, the City shall designate the ^{licensed} transporter and ^{permitted} ~~licensed~~ storage/disposal facility. *no bulky sets sets specific RCRA I.D. # - ?*
conform to RCRA guidelines.

In the event that visibly contaminated drilling fluids, auger cuttings, decontamination wash water, disposable clothing, or other materials are generated during the course of this investigation, the contaminated materials will be placed in designated 55-gallon lockable drums. Secure storage (fenced and locked) for any drums containing contaminated materials will be provided at the City's Municipal Service Center at 7305 Oxford Street (Figure 18). ^{? - transporter} Drums containing contaminated materials will be released to a licensed transporter registered by the United States Environmental Protection Agency under the Resource Conservation and Recovery Act for transport to a storage/disposal facility registered by the United States Environmental Agency under ^{and in compliance w/} the Resource Conservation and Recovery Act. The release of material to a licensed transporter will occur within 90 days of the completion of drilling activities for the St. Peter Aquifer monitoring well installations. Transport of material from the City's Municipal Service Center by a non-registered transporter will not be permitted.

The City's Project Leader will contact the United States Environmental Protection Agency and Minnesota Pollution Control Agency Project Leaders or their designated alternates to provide a status report on any activities conducted in accordance with this Contingency Plan.

TASK 3 SITE INVESTIGATION

The five monitoring wells will be installed within 120 days of receiving approval pursuant to Part G of the Consent Decree. The wells will be constructed and completed in accordance with this Plan. The well installation work is part of a hydrogeologic investigation and ^{no waste characterizations or soils and sediment investigations are relevant.} *yes they are* ^{purpose}

Within 30 days of completing the new monitoring well installations, ground-water samples will be collected for PAH analyses. Before the samples are taken a survey will be conducted to determine the horizontal position of each well and the vertical elevation of the measuring points. Water levels will then be measured and ground-water quality samples will be taken at the new wells and at existing

NON-RESPONSIVE

STATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
STATION	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
STATION	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
STATION	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
STATION	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
STATION	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600
STATION	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700
STATION	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
STATION	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900
STATION	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000

Figure 18. Location of St. Louis Park Municipal Service Center

1 all all
2. etc + s/c

wells W14, W24, W33, W122, W129, W133, P116, and SLP3. These procedures will be done in accordance with the Sampling Plan, which is described in Section 3.2 of the RAP. Wells SLP3 and at least six other St. Peter Aquifer monitoring wells will be re-sampled for PAH monitoring within 6 months of the first sampling round, and again within 12 months of the first sampling round. The St. Peter Aquifer wells to be sampled during the second and third rounds will be determined based on a review of the results of the first sampling round. *specify up front; agencies have final approval.*

TASK 4 SITE INVESTIGATION ANALYSIS

This task was previously performed during the CD-RAP negotiations and the results are reflected in that document. Therefore, no separate site investigation analysis will be performed for this project.

TASK 5 LABORATORY AND BENCH-SCALE STUDIES

This task is not required because additional studies are not necessary to fully evaluate remedial alternatives. The remedial alternatives were evaluated during the CD-RAP negotiations, and the results are reflected in that document.

TASK 6 REPORTS

for low level FS guidance - USEPA-1985

The requirements for status reports for all activities carried out in accordance with the CD-RAP are described in that document. No separate progress reports will be prepared for this project.

A final report summarizing the results of this investigation will be submitted within 90 days of completing the second round of ground-water sampling described in Task 3. The report will contain all boring logs, well completion details, analytical data, water level measurements, and other information obtained during this investigation. The purpose and objectives of the final report involve *comparing* the ground-water quality data from the St. Peter Aquifer monitoring wells to the criteria established in the CD-RAP to determine if contamination exists. A hydrogeologic evaluation will be made to determine if any present contamination is spreading. Recommendations on the need for a Feasibility Study will be made. *Because of the focus of this investigation, and of any Feasibility Study that may follow this investigation, the information presented in the final report will not include the expanse of information required by EPA's guidance document on Remedial Investigations under CERCLA, and will only provide the information required for the purpose of the final report, as outlined above.* *yes it will*

append

APPENDIX A
HISTORY OF RESPONSE ACTIONS

The following background and history of response actions is an excerpt from the MPCA Board Item on April 22, 1986 "Request for Approval of a Consent Decree with the Reilly Tar & Chemical Corporation and Other Parties for the Purpose of Completing Remedial Investigations and Feasibility Studies and Developing and Implementing Response Actions at and Around the Reilly Tar Site in St. Louis Park". This material is in Section I of the Issue Statement of that MPCA Board Item.

Between 1917 and 1972, Reilly Tar & Chemical Corporation (Reilly) operated a coal tar distillation and wood preserving plant, known as the Republic Creosote Company, in St. Louis Park. This plant was located on an 80 acre tract near State Highway 7 and Louisiana Avenue (the Reilly Site; Figure 1). Reilly disposed of wastewater from the operation in a network of ditches which discharged into a swamp south of the Reilly Site. In addition, the wood treating activities conducted on the Reilly Site resulted in creosote and coal tar contamination of the soils from drippings and spills. The major constituents of coal tar are phenolic compounds and polynuclear aromatic hydrocarbons (PAH). Some PAH compounds are carcinogenic, and are thus a source of concern when a municipal drinking water supply is contaminated with these compounds. (As used in the remainder of this board item, "contaminated" or "contamination" means PAH or phenolics are present in soil or ground water resulting from activities of Reilly at the Reilly Site.)

In 1932, the first municipal well in St. Louis Park (Old SLP #1) was constructed at Brunswick Avenue and West 36th Street, approximately one-half mile east of the Reilly Site. The well was finished in the Prairie du Chien-Jordan aquifer (Figure 2). After several weeks of operation, the well was closed due to taste and odor complaints (the taste was described as "swampy"). Laboratory tests showed that phenolic compounds were the apparent cause of the problem. Phenolics cause water to have an unpleasant taste and odor when the water is chlorinated, but these compounds are not believed to have adverse health effects at the low levels which cause the taste and odor problems.

Attempts to remedy the situation were unsuccessful, and the well was abandoned. Well drillers at the time speculated that the Reilly Site might be the source of the problem. Although Reilly, at the time, insisted that the problems at the municipal well were the result of "decaying vegetation" from the swamp south of the Reilly Site, it filled an unused well (W105) located on the Reilly Site with sand and extended the casings in Reilly's main water supply well (W23) to reduce interaquifer flow of possibly contaminated water.

Complaints from nearby residences over contamination of shallow wells and of odors from air emissions became more common, especially after extensive residential development of the area during the late 1940's into the 1950's. Because of continuing problems with soil and surface water contamination and odors 1/, the City of St. Louis Park (City) and the Minnesota Pollution Control Agency (MPCA) through the Attorney General (the State) filed suit against Reilly in 1970. In 1972, the City purchased the Reilly Site from Reilly, and

1/ See paragraph thirteen, page 9, of the attached Consent Decree for a listing of various studies and/or reports, chemical analysis and field investigations relating to the Reilly Site.

the plant was dismantled and removed. The City intended to use the property for a realignment of Louisiana Avenue and for residential development, and dropped its lawsuit against Reilly as a condition of the sale. However, the State did not drop the lawsuit, which is still pending and will be dismissed as part of the proposed settlement.

In 1974, the City contracted with Gerald Sunde, a consulting engineer, to investigate pathways for the movement of contaminants. Sunde concluded that wells in the area open to several aquifers (multi-aquifer wells) provide a significant pathway for the spread of contamination from contaminated surficial aquifers to deeper aquifers which would otherwise be protected from contamination by several bedrock layers. In 1975, the MPCA contracted with Barr Engineering to investigate subsurface contamination at and south of the Reilly Site. The results of this study showed significant contamination of soil and the surficial aquifer (the drift) with creosote. Because it appeared that Sunde's assessment of the pathways for contamination to deep aquifers was, at least in part, correct, the Minnesota Department of Health (MDH) in 1978 and 1979 contracted for the closure of 29 multi-aquifer wells in areas where the surficial aquifers were the most contaminated. In addition, the City and the U.S. Geological Survey installed a packer and casing in the former Reilly well, W23, to stop the extensive downhole flow of contaminated water into the Prairie du Chien - Jordan Aquifer.

Louisiana Avenue was constructed through the Reilly Site during the mid-1970's, and some multi-family housing units were constructed in the northern half of the Reilly Site during this same time period.

In 1978 the MDH began analyses of water from municipal supply wells in St. Louis Park and neighboring communities for PAH using high performance liquid chromatography. These and subsequent analyses led to the discovery of significant concentrations of PAH in six St. Louis Park wells and one Hopkins well, and these wells were shut down during the period 1978-81.

As a result of the determination that area ground water was contaminated the State amended, in 1978, its complaint in the lawsuit with Reilly to include claims for ground water contamination. All of the municipal wells cited above are finished in the Prairie du Chien-Jordan aquifer, which is the most heavily used aquifer for municipal drinking water supplies in the Twin Cities metropolitan area. The City of St. Louis Park has since overcome part of the resulting water supply shortfall through water conservation measures, installation of a new well in the Mt. Simon-Hinckley aquifer, and an interconnection with the City of Plymouth. In an attempt to understand the processes of contaminant transport in the Prairie du Chien-Jordan, the MDH and MPCA contributed toward a ground water flow and contaminant transport modeling study performed by the United States Geological Survey (USGS). In addition, the MDH funded a study by Hickok and Associates of the feasibility of ground water gradient control 2/ in 1981.

The MPCA received a \$400,000 grant from the U.S. Environmental Protection Agency (EPA) in December, 1981, and used this grant to finance a feasibility study conducted by the MPCA contractor, CH2M Hill, for replacement or treatment

2/ The term "gradient control", as used in this discussion, refers to the utilization of a pumping well or wells, usually located near the leading edge of the contamination plume, to control the flow of ground water in an aquifer to contain contamination within the area of control. It is in contrast to "source control", in which highly contaminated water is pumped at or near the source.

of the lost water supply; and to locate, investigate, and close multi-aquifer wells. In December, 1982, the EPA awarded the MPCA a \$1.99 million grant under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to continue these studies, and to provide more funding for the USGS ground water modeling study for the purpose of designing a gradient control well system to control the movement of contaminants in the Prairie du Chien-Jordan aquifer.

The results of these studies have provided sufficient information to design a remedial approach for the contamination in the Prairie du Chien-Jordan aquifer. Multi-aquifer well investigation under the CERCLA grant has been limited to date, to two priority wells located on the Reilly Site. The most important of these, W23, was found to have a plug of coal tar in it, and has been cleaned out. The other well, W105, was the water supply well for the sugar beet plant which occupied the Reilly Site around the turn of the century, and was used by Reilly as a backup supply well until 1933. W105 was not found to be a source of contamination as was W23. The drinking water restoration study conducted by CH2M Hill, which analyzed the feasibility of various methods of treating drinking water, deeper wells, and an interconnection with Minneapolis, concluded that treatment with granular activated carbon (GAC) was the most cost-effective method of restoring the City's lost water supply. The USGS has completed its ground water flow modeling work, and this model has been used to examine gradient control schemes.

In September, 1980, the EPA filed suit against Reilly alleging violation of the Resource Conservation Recovery Act (RCRA). The State and St. Louis Park joined the lawsuit in October, 1980, followed by the City of Hopkins in June, 1981. After passage of CERCLA, the State filed an amended complaint in May, 1981, followed by St. Louis Park, the EPA, and Hopkins respectively in

August, September, and October, 1981. The State filed a second amended complaint under the Minnesota Environmental Response and Liability Act ("MERLA") in 1985 followed by St. Louis Park and Hopkins. In the event that agreement is not reached on the Consent Decree, the case is scheduled to be heard before U.S. District Court Judge Paul Magnuson.

In addition to the above litigation, Reilly filed a counterclaim against St. Louis Park, and St. Louis Park asserted a cross-claim against the State. Other parties involved with the purchase and development of the northern portion of the Reilly Site filed cross-claims against St. Louis Park and Reilly. 3/

In May, 1983, Reilly and its consultant, Environmental Research & Technology, Inc. (ERT) issued a report on the St. Louis Park ground water contamination. Discussion among MPCA, EPA, Reilly and ERT staff led to a period of negotiations toward a settlement. These talks broke down in early 1984.

Both the MPCA and EPA have instituted administrative action against Reilly, pursuant to the respective State and federal Superfund acts, in order to compel Reilly to undertake necessary remedial actions. The EPA issued a Record of Decision (ROD) in June, 1984 affirming that the most cost-effective remedy for restoring the City's lost water supply was installation of a GAC treatment system. In August, 1984, the EPA issued to Reilly an Administrative Order directing Reilly to design and construct the GAC system for City wells SLP 10 and 15 as provided in the ROD. In December, 1984, the MPCA issued a Request for Response Action (RFRA) to Reilly outlining a range of remedial investigations, feasibility studies, and necessary remedial actions.

3/ The following organizations were included as defendants in the lawsuit because they were involved with the purchase and development of the northern portion of the Reilly Site from St. Louis Park: Housing and Redevelopment Authority of St. Louis Park, Oak Park Village Associates, and Philips Investment Co.

Following these administrative actions, extensive negotiations, which had previously broken down, resumed among the MPCA, EPA, St. Louis Park, and Reilly in an effort to reach an effective settlement. General agreement on the terms and conditions of a proposed Consent Decree was reached in the Summer of 1985. However, because of its complex nature and the large number of parties involved, final agreement was delayed. Since the likelihood of settlement was always present, the MPCA staff did not return to the MPCA Board for further administrative actions.

Since general agreement regarding a Consent Decree had been reached in mid 1985, Reilly did proceed to design and construct a GAC system for City wells SLP 10 and 15. Reilly completed the construction of the GAC system in December, 1985 and the system is expected to be operational by May, 1986.

The following background and history of response actions is Part C of the Consent Decree. A list of relevant reference documents is included.

1. From 1917 until 1972, Reilly was engaged in the business of coal tar distillation and pressure treatment of wood products at its plant site at 7200 Walker Street, St. Louis Park, Hennepin County, Minnesota (hereinafter "the Site"). The Site encompassed an eighty (80) acre tract, which consists of Lot 1, Block 1; Lot 1, Block 2; Lot 1, Block 3; Lot 1, Block 4; Lot 1, Block 5; Lot 1, Block 6; Lot 1, Block 7; Lot 1, Block 8; Lot 1, Block 9; Lot 1, Block 10; all in Oak Park

Village according to the plat thereof on file in the office of the County Recorder of Hennepin County, Minnesota.

2. On or about October 2, 1970, the State, through its Pollution Control Agency, and St. Louis Park, filed a complaint in the Hennepin County District Court of the State of Minnesota alleging violations by Reilly of state and municipal pollution control laws and regulations. State of Minnesota by the Minnesota Pollution Control Agency, and the City of St. Louis Park v. Reilly Tar & Chemical Corporation, Hennepin County District Court, Civil File No. 670767 (hereinafter "Hennepin County Lawsuit").

3. On April 14, 1972, St. Louis Park agreed to purchase the Site from Reilly. The purchase agreement included a promise by St. Louis Park to obtain dismissals with prejudice by the State and by St. Louis Park of the Hennepin County Lawsuit. The purchase agreement also provided for acceptance by St. Louis Park of the property in an "as is" condition, including "any and all questions of soil and water impurities and soil conditions," and an agreement by St. Louis Park "to make no claim against Reilly for damages relative to soil and water impurities, if any, in any way relating to the premises sold herein, or relative to any other premises in which the City of St. Louis Park holds an interest. . . ."

4. A closing was scheduled on the property for June 19, 1973. However, the State did not execute a dismissal

of the Hennepin County Lawsuit. Accordingly, the City of St. Louis Park agreed that it would "hold Reilly harmless from any and all claims which may be asserted against it by the State of Minnesota, acting by and through the Minnesota Pollution Control Agency, and will be fully responsible for restoring the property, at its expense, to any condition that may be required by the Minnesota Pollution Control Agency". The City of St. Louis Park and Reilly executed and filed dismissals with prejudice of their claims in the Hennepin County Lawsuit, and the closing took place thereafter.

5. On June 21, 1973, the property was conveyed by quitclaim deed from St. Louis Park to the Housing and Redevelopment Authority of St. Louis Park, Minnesota, which thereafter conveyed part of the property to Oak Park Village Associates, Rustic Oaks Condominium, Inc. and Philip's Investment Co.

The Agreement for Purchase and Sale of Real Estate dated October 4, 1977 and the First Addendum to the Agreement dated October 6, 1977 between the St. Louis Park Housing and Redevelopment Authority and Diversified Equities Corporation [Oak Park Village Associates] regarding Lot 1, Block 3, Oak Park Village, Hennepin County, Minnesota, provides as follows:

14. Environmental Matters

The Agency [St. Louis Park Housing and Redevelopment Authority] shall prepare and shall incur all expenses for any environmental approvals, assessments, environmental impact

statements or such other environmental review documents deemed necessary or desirable by governmental authority.

Agency [St. Louis Park Housing and Redevelopment Authority] agrees to indemnify and save Redeveloper harmless from and against any and all loss or damage Redeveloper or successors may suffer from damage to improvements constructed on the Property as a result of claims, demands, costs or judgments against and arising out of soil or ground water contamination existing as of the date hereof, or caused by conditions existing as of the date hereof.

The Agreement for Purchase and Sale of Real Estate dated June 1, 1979 by and between the Housing and Redevelopment Authority of St. Louis Park and Ben Weber [Philip's Investment Co.] and the City of St. Louis Park regarding Lot 1, Block 6, Oak Park Village, Hennepin County, Minnesota, provides as follows:

14. Environmental Matters.

a. Both the City and the Redeveloper agree that the Stipulation between the City and the PCA dated April 19, 1977, is capable of a possible variety of interpretations. As between the Agency [St. Louis Park Housing and Redevelopment Authority], the City and the Redeveloper, as an inducement to the City and Agency to allow the Redeveloper to develop the Property and as security against the Redeveloper, or its assigns or successors in interest, claiming the right to benefit from a broader interpretation of said Stipulation and as an inducement to the Redeveloper to develop the Property and as security against the City or Agency claiming the right to benefit from a narrower interpretation of said Stipulation, the City, Agency and Redeveloper agree that, as between the parties to this Agreement, this paragraph 14 shall constitute the sole remedy available to Redeveloper against the City and Agency for any action or claim against or loss or damage to the

Redeveloper which is based on, derived from, or related to the soil or groundwater conditions of the Property, and shall constitute, as between the parties to this agreement, their interpretation of the Stipulation.

b. The City will not require the Redeveloper to excavate soil from the Property in question because of soil or groundwater contamination resulting from the operations of the former Republic Creosote Plant.

c. The City will indemnify the Redeveloper from damage consisting of physical destruction or injury to improvements on the property due solely to soil excavation on the Property required by public agencies. This indemnification shall not include consequential damage, lost income, lost profit or other forms of indirect loss or damage nor shall it include damage arising from personal injury. Indemnification shall be on a replacement cost less depreciation basis.

d. The indemnification granted by this agreement shall be secondary to any other rights or potential rights which the Redeveloper may have to compensation for any damage or loss whether through eminent domain, grants or otherwise. The Redeveloper shall exercise good faith effort to seek and obtain such compensation before presenting a claim under this indemnification agreement. Any compensation from any other source for damages indemnified herein shall reduce the indemnification liability of the City dollar per dollar.

e. This indemnification and agreement shall not be assignable except to the first mortgagee and shall terminate on January 1, 1985. All claims to indemnification under this agreement must be made in writing and received by the City Clerk of the City prior to January 2, 1985.

6. In April, 1978, the State moved to amend its complaint in the Hennepin County Lawsuit, alleging that PAH substances contained in Reilly's coal tar and creosote wastes had entered the ground water beneath the Site and that their

further migration threatened to contaminate aquifers relied on for public water supply. At the same time, St. Louis Park moved to intervene as a plaintiff. The motions were granted and interlocutory review was denied by the Minnesota Supreme Court. Reilly subsequently tendered defense of the action to St. Louis Park and counterclaimed against St. Louis Park, asserting that St. Louis Park was responsible for dealing with this problem under the hold harmless agreement made at the time of its purchase of the Site.

7. On or about September 4, 1980, the United States commenced this action by filing a complaint under Section 7003 of the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6973, alleging, inter alia, the existence of an imminent and substantial endangerment to health and the environment due to the handling, treatment, storage, transportation, disposal and presence of hazardous waste at the Site. On or about October 15, 1980, the State and St. Louis Park were granted leave to intervene in the RCRA Section 7003 claim and to assert additional claims under Minnesota law. On or about June 16, 1981, Hopkins was granted leave to intervene in the RCRA Section 7003 claim and to assert additional claims under Minnesota law.

8. On or about September 9, 1981, the United States filed an amended complaint, alleging in addition to the RCRA § 7003 claim, claims under Sections 106 and 107 of the

Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606 and 9607.

9. On or about May 27, 1981, the State filed an amended complaint, asserting claims under Section 7003 of RCRA, 42 U.S.C. § 6973, Section 107 of CERCLA, 42 U.S.C. § 9607, Minn. Stat. §§ 115.061, 115.07, 115.071, and Minnesota Rule WPC 4(b) [Minn. Rule Part 7100.0020], and Minnesota common law.

10. On or about August 31, 1981, and October 16, 1981, respectively, St. Louis Park and Hopkins filed amended complaints alleging, inter alia, claims under Section 7003 of RCRA, 42 U.S.C. § 6973, Section 107 of CERCLA, 42 U.S.C. § 9607, Minn. Stat. Chapter 116B, and Minnesota common law.

11. On or about April 5, 1985, the Court granted the State's motion for leave to file a second amended complaint, adding claims under the Minnesota Environmental Response and Liability Act ("MERLA"), Minn. Stat. Ch. 115B. The State subsequently filed such a second amended complaint. Pursuant to stipulations, St. Louis Park and Hopkins later also filed second amended complaints, each of which added MERLA claims.

12. Reilly, in its answers to the various complaints referenced above, has denied and continues to deny liability, has raised several affirmative defenses, and has asserted a counterclaim against St. Louis Park. Various other Parties have asserted cross-claims, including a cross-claim by St. Louis Park against the State, a cross-claim of Oak Park Village

Associates against the Housing and Redevelopment Authority of St. Louis Park and a cross-claim of Philip's Investment Co. against Reilly.

13. Since 1969, a number of studies and/or reports, chemical analyses and field investigations relating to the Site have been undertaken. By listing the items below, the Parties do not necessarily endorse the accuracy, correctness, precision, quality, or validity of the information and opinions contained therein. These analyses, investigations and studies include but are not limited to the following:

(a) Studies and/or Reports

- (1) "Ground Water Investigation Program at St. Louis Park, MN," by E. A. Hickok & Associates, Inc., September, 1969.**
- (2) "Memorandum of Waste Disposal at Republic Creosote Co. and Reilly Tar & Chemical Co.," by Minnesota Pollution Control Agency (MPCA Board Item), April, 22, 1970.**
- (3) "An Assemblage of Analytical Data Regarding the Reilly Tar & Chemical Property, St. Louis Park, Minnesota," by the St. Louis Park Health Department, August 1, 1972.**
- (4) "Status Report on Creosote Site and TexaTonka Area", prepared by the St. Louis Park Planning Department, January 11, 1973.**
- (5) "Surface and Subsurface Ground Reclamation; Republic Creosote Site, City of St. Louis Park", prepared by OSM Consulting Engineers, April 23, 1973.**

- (6) "Storm Water Study; Public Improvement #72--43 (Republic Creosote Area)," prepared by OSM Consulting Engineers, August 6, 1973.
- (7) "Geology of the St. Louis Park Area - A Review by the Minnesota Geological Survey; Report on Investigation of Municipal Water Supply, St. Louis Park," prepared by the Minnesota Department of Health, March 1974.
- (8) "Soil Investigation; Proposed Storm Sewer and Holding Ponds near Highway 7 and Louisiana Avenue, St. Louis Park," prepared by Soil Exploration Co., April 16, 1974.
- (9) "Hydrogeologic Study of the Republic Creosote Site," prepared by Gerald Sunde, Consulting Engineer, July, 1974.
- (10) "Report on Investigation of Phenol Problem in Private and Municipal Wells in St. Louis Park, Minnesota," prepared by Minnesota Department of Health, September, 1974.
- (11) Memorandum from F. F. Heisel, Minnesota Department of Health, to P. Gove, Minnesota Pollution Control Agency. "St. Louis Park Creosote Contamination Study," November 14, 1975.
- (12) "Data Regarding The History and Development of a Storm Sewer System for the City in the Area of the Former Republic Creosote Property," prepared by the City of St. Louis Park, November 15, 1974.
- (13) "Memorandum on Groundwater Contamination, St. Louis Park, MN," by Minnesota Pollution Control Agency, (MPCA Board Item) November 19, 1974.
- (14) "Memorandum on St. Louis Park Groundwater Situation," by the Minnesota Pollution Control Agency, (MPCA Board Item) December 13, 1974.

- (15) "Soil and Ground Water Investigation Coal Tar Distillation and Wood Preserving Site, St. Louis Park - Phase I Report," prepared by Barr Engineering Co., May 1976.
- (16) "Stability Study of Para Benzo Quinone for the City of St. Louis Park," prepared by Sanitary Engineering Laboratories Inc. (SERCO), June 1976.
- (17) "Soil Boring and Chemical Analysis of the Northern Portion of Oak Park Village," prepared by National Biocentric, Inc., September 17, 1976.
- (18) "Soil Contamination by Creosote Wastes," prepared by National Biocentric, Inc., November 1, 1976.
- (19) "Development Plan, Northern Portion, Oak Park Village," prepared by St. Louis Park, December 2, 1976.
- (20) "Review of Recent Studies of Soil Contamination at the Former Republic Creosote Site - Recommendations to City's Proposed Development Plan," by Minnesota Pollution Control Agency, December 28, 1976.
- (21) "Soil and Ground Water Investigation Coal Tar Distillation and Wood Preserving Site, St. Louis Park - Phase II Report," prepared by Barr Engineering Co., June 1977.
- (22) "Assessment of Possible Human Health Effects Resulting from Contamination of the Former Republic Creosote Site," prepared by the Minnesota Department of Health, October 1977.
- (23) "Soil Report; Prepared by Oak Park Village, St. Louis Park, Minnesota," prepared by Soil Testing Service of Minnesota, Inc., January 5, 1978.
- (24) "Recommendations for Plugging or Modification of Abandoned Wells in the

Area of the Former Republic Creosote Plant," prepared by the City of St. Louis Park, January 11, 1978.

- (25) "Report of Well Water Survey, St. Louis Park, Minnesota," prepared by Sanitary Engineering Laboratories, Inc., (SERCO) June-July 1978.**
- (26) "Report on the Existing Creosote Problem in St. Louis Park, Minnesota," prepared by James Bailey, Agricultural Engineering, University of Minnesota, July 1, 1978.**
- (27) "Health Implications of Polynuclear Aromatic Hydrocarbons in St. Louis Park Drinking Water," prepared by the Minnesota Department of Health, November 1978.**
- (28) "Status Report to the MPCA: Proposed Development, Oak Park Village," prepared by St. Louis Park, November 14, 1978.**
- (29) "Water Quality Development in Oak Park Village," prepared by St. Louis Park Planning Department, December 15, 1978.**
- (30) "Letter Report Tabulating Information on Existing Wells in St. Louis Park," prepared by United States Geological Survey, February 6, 1979.**
- (31) "Status Report: St. Louis Park Development," by the Minnesota Pollution Control Agency (MPCA Board Item), March 27, 1979.**
- (32) "Progress Report: Investigation of Coal Tar Derivatives in Ground Water - St. Louis Park," prepared by the United States Geological Survey, April 13, 1979.**
- (33) "Epidemiologic Investigation of Third National Cancer Survey Data for St. Louis Park, Edina, Richfield and Minneapolis St. Paul SMSA with a**

Historical Review of St. Louis Park's Water Supply," prepared by Kari Dusich, September 1979.

- (34) "Emergency Pumpout Well For Reilly Tar Site, St. Louis Park, Minnesota," prepared by Ecology and Environment, Inc., 1980.
- (35) "Examination of Cost Estimate For Three Tasks to be Completed For The Reilly Tar and Chemical Project, St. Louis Park, MN," prepared by Ecology and Environment, Inc., 1980.
- (36) "Summary Report on the City of St. Louis Park Activated Carbon Pilot Plant Study," prepared by Sanitary Engineering Laboratories, Inc., (SERCO), January 11, 1980.
- (37) "Cancer Rates in a Community Exposed to Low Levels of Creosote Components in Municipal Water," prepared by Dusich, Sigurdson, Hall, Dean, Minnesota Medicine, November 1980.
- (38) "Preliminary Evaluation of Ground Water Contamination by Coal Tar Derivative, St. Louis Park, MN," prepared by the United States Geological Survey, January 1981.
- (39) "Report on Drinking Water Treatment and Remedy Evaluation for St. Louis Park, MN," prepared by Eugene A. Hickok and Associates, Inc., April 1981.
- (40) "Report and Statistic - Water Quality: Results of St. Louis Park Water Samples," prepared by H. Taylor, United States Geological Survey, June 10, 1981.
- (41) "Study of Ground Water Contamination in St. Louis Park, MN," prepared by Eugene A. Hickok & Associates, et. al., November 1981.
- (42) "Dispersion and Sorption of Hydrocarbons in Aquifer Material," by

G. Cohn (thesis) University of Minnesota, 1982.

- (43) "Terminating An Endless Search: An Action Approach to Solving the Water Problem," prepared by St. Louis Park, January 11, 1982.
- (44) "Request for Authorization to Negotiate and Enter into Cooperative Agreement with the U.S. EPA to Obtain Funds for Additional Cleanup Work at the Reilly Tar Site, St. Louis Park," by the Minnesota Pollution Control Agency (MPCA Board Item), May 25, 1982.
- (45) "Degradation of Phenolic Contaminants in Ground Water by Anaerobic Bacteria: St. Louis Park, MN," prepared by Erlich, Goerlitz, Godsy & Hult, United States Geological Survey, November 1982.
- (46) "Evaluation of Groundwater Treatment and Water Supply Alternatives for St. Louis Park, MN," prepared by CH2M Hill, 1982-1983.
- (47) "Recommended Plan for a Comprehensive Solution of the Polynuclear Aromatic Hydrocarbon Contamination Problem in the St. Louis Park Area," prepared by Environmental Research & Technology, Inc. for Reilly Tar & Chemical Corporation, April 1983, plus Errata, June 27, 1983 and November 27, 1984.
- (48) "Health Risk Assessment and Environmental Effects of Compounds Contaminating St. Louis Park Groundwater: Selected Two - and Three - Ring Heterocycles and Indene," prepared by Stephen M. Mabley, Minnesota Department of Health, Section of Health Risk Assessment, July 1983.
- (49) "Evaluation of Activated Carbon Treatment Alternative for Polynuclear Aromatic Hydrocarbon Removal for Groundwater in the St. Louis Park Area," prepared by Calgon Carbon Corporation, November 18, 1983.

- (50) "Request for Authorization to Negotiate and Execute an Amendment to the Current Cooperative Agreement with the U.S. Environmental Protection Agency for Investigation and Remedial Action at the Reilly Tar and Chemical Company hazardous Waste Site in St. Louis Park," by the Minnesota Pollution Control Agency (MPCA Board Item), November 22, 1983.
- (51) "Assessment of Groundwater Contamination by Coal Tar Derivatives, St. Louis Park Area, MN", prepared by M. F. Hult, United States Geological Survey, Open File Report 84-867, 1984.
- (52) "Record of Decision, Remedial Action Alternative Selection," prepared by the United States Environmental Protection Agency, June 6, 1984.
- (53) "Evaluation of Granular Activated Carbon for the Removal of Polynuclear Aromatic Hydrocarbons from Municipal Well Water in St. Louis Park, MN," prepared by Calgon Carbon Corporation, September 10, 1984.
- (54) "Sampling and Analysis Plan for Calgon Accelerated Column Testing of SLP 15 Water," prepared by Environmental Research & Technology, Inc., October 25, 1984.
- (55) "Request for Issuance of a Request for Response Action to the Reilly Tar and Chemical Corporation Regarding Contamination At and Around the Reilly Tar Hazardous Waste Site in St. Louis Park," by the Minnesota Pollution Control Agency (MPCA Board Item), December 18, 1984.
- (56) "Ground-water Flow in Prairie du Chien Jordan Aquifer Related to Contamination by Coal Tar Derivatives, St. Louis Park, MN," prepared by J. R. Stark and M. F. Hult, United States Geological Survey, 1985.

- (57) "Calgon ACT Study: Initial Results from the Accelerated Column Test of PAH Removal Performance for Activated Carbon Treatment of Water From SLP 15," prepared by Twin City Testing, January 11, 1985.
- (58) "Calgon ACT Study: Further Results From the Study of PAH Removal by Activated Carbon Treatment," prepared by Twin City Testing, January 30, 1985.
- (59) "Reilly Tar and Chemical: Analysis of Water From Three St. Peter Wells," prepared by Twin City Testing, January 31, 1985.
- (60) "Accelerated Column Test for Removal of Polynuclear Aromatic Hydrocarbons from Contaminated Groundwater," prepared by Calgon Corporation, March 8, 1985.
- (61) "PAH Analysis by GCMS," prepared by Twin City Testing March 26, 1985
- (62) "Draft Work Plan R1, Reilly Tar Site, St. Louis Park, Minnesota," prepared by CH2M Hill and Ecology & Environment, April 27, 1985.
- (63) "Predesign Memorandum Evaluation of Granular Activated Carbon System Alternatives For Removal of Polynuclear Aromatic Hydrocarbons From Municipal Well Water in St. Louis Park, Minnesota", prepared by Ch2M Hill, May 29, 1985.
- (64) "PAH Threshold Odor Determination in St. Louis Park Municipal Supply Water," prepared by Environmental Research and Technology, Inc., May 30, 1985.
- (65) "Volatile Organic Analysis of the St. Louis Park Municipal Drinking Water Supply System, March, 1985," prepared by Environmental Research & Technology, Inc., May 30, 1985.
- (66) Feasibility of Community-Wide Epidemiologic Studies of Drinking Water and Health: St. Louis Park and New Brighton", prepared by the Minnesota Department of Health, December 31, 1985.

- (b) Field investigations and chemical analyses of water (surface and/or ground water) and soils, including associated field notes, chain of custody records, raw data sheets, sampling analysis protocols, boring and well logs and water level measurements. In general, the results of soil borings and water samples are found in the list of studies and/or reports under Part C. 13(a). (Dates listed usually reflect the time of the investigation.)
- (1) Preliminary soil investigation for the engineering properties of the soil, performed by Soil Engineering Services, Inc., October 13, 1969.
 - (2) Mellon-Rice data on well water and plant wastewater samples, Carnegie-Mellon University and C.W. Rice Division, NUS, November 5, 1970.
 - (3) Soil sample analyses, Tri-City Public Health Lab, 1971 and 1973.
 - (4) Analysis of soil and water samples from the St. Louis Park area, by the Minnesota Department of Health, 1973 to present.
 - (5) Analysis of soil and water samples by Twin Cities Testing and Engineering Laboratory, Inc., and Soil Exploration Company, 1974 to present.
 - (6) Analysis of soil and water samples by Sanitary Engineering Laboratories, Inc. (SERCO), 1975, 1976, 1977, 1978 and 1982.
 - (7) Soil borings performed by Braun Engineering, 1974, 1979, 1980, and 1982.
 - (8) Well investigations pursuant to well abandonment program performed by Minnesota Department of Health, 1978-present.
 - (9) Analysis of soil and water by United States Geological Survey, 1978-present.

- (10) Analyses of groundwater, by Pace Laboratories, Inc., 1978-1980, 1983-1984 (1983-1984 analyses performed by Rocky Mountain Analytical Laboratory).
- (11) "Results of Analysis of Water Samples, and Soil Samples for Polynuclear Aromatic Compounds (Hydrocarbons, Azarene, Phenols)", by Midwest Research Institute, October 7, 1981.
- (12) Analyses of Ground Water, by Capsule Laboratories, Inc., 1981, 1982, and 1983.
- (13) Soil borings and analyses by GCA Corp., 1982-1983.
- (14) Water analyses by Monsanto Research Corp., 1982-1984.
- (15) Water analyses by Environmental Testing and Certification Corporation, 1983.
- (16) Soil boring and chemical analyses by National Biocentric, Inc., 1976.
- (17) St. Louis Park area water well search and inventory questionnaires, prepared by E. A. Hickok and Associates, Inc., 1982-1983.
- (18) Progress reports on the investigation and clean-out of W23 and W105, E.A. Hickok & Associates, Inc., 1982 to present.
- (19) Water samples and analyses by CH2M Hill, 1982 and 1983.
- (20) Water samples and analyses by Environmental Research and Technology, Inc., 1982 to present.
- (21) Water samples and analyses by Acurex Corporation, 1984 to present.
- (22) Water analyses by United States Environmental Protection Agency 1977 and 1981-1982.

SECTION B
QUALITY ASSURANCE PROJECT PLAN

**QUALITY ASSURANCE PROJECT PLAN
FOR THE ST. PETER AQUIFER REMEDIAL INVESTIGATION**

**ERT Document No. QAE317-500
November 1986**

**Prepared for
THE CITY OF ST. LOUIS PARK
St. Louis Park, MN 55416**

**ERT - A RESOURCE ENGINEERING COMPANY
696 Virginia Road, Concord, Massachusetts 01742**

7108D PE 317-500

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1.0 INTRODUCTION

1.1 Background

ERT and the City of St. Louis Park will complete certain tasks in fulfillment of the Consent Decree and Remedial Action Plan for the St. Louis Park Site. This Quality Assurance Plan pertains to all work to be performed by ERT and other contractors to install five new groundwater monitoring wells in the St. Peter Aquifer. The new wells will be monitored along with a network of existing wells to determine the nature and extent of contamination in the aquifer. Monitoring data will be compared with drinking water criteria for this purpose. The existing monitoring network is not adequate for determining the nature and extent of contamination, hence the need for the five additional wells. Further details on the work to be performed, its purpose and the methodology to be employed may be found in the Site Management Plan. The schedule for this work is to complete the well construction within 120 days of approval of this plan pursuant to Part G of the Consent Decree.

1.2 Quality Objectives

The purpose of this Quality Assurance Plan is to define the Quality Assurance and Quality Control provisions to be implemented to ensure that:

- o The new monitoring wells will conform to design and location specifications given in the Site Management Plan.**
- o The work is performed in an efficient manner.**
- o Field records generated during the course of the field work are complete and accurate.**
- o The objectives of the Consent Decree are met.**

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization is illustrated in Figure 2-1. The Project Manager, Mr. William Gregg will oversee and coordinate all project activities, schedule and direct all field activities and will conduct correspondence with St. Louis Park. The Project Manager/Field Coordinator is also responsible for maintaining records of the work performed on the project and for archiving those records in the Central File upon completion of the work. The Project Quality Assurance Officer is responsible for ensuring that this plan is implemented and that project data undergo technical and peer review, as necessary. The U.S. EPA, MPCA, and MDH will have the opportunity to audit, comment on, or otherwise participate in Quality Control procedures, and inspect the work done on this project at any time. The drilling and well installation contractor will perform all work necessary to install the new monitoring wells.

3.0 QA/QC - FIELD ACTIVITIES

3.1 Training

All field personnel working on the St. Peter Aquifer Remedial Investigation (including subcontractors) will receive training on the purpose of the work, the procedures to be employed and the Project Health and Safety Plan.

3.2 Subcontractor Quality Control

Subcontractor quality control is that system of activities which ensures that products or services obtained from subcontractors fulfill the needs of the project.

Periodic quality control inspections of each contractor will be performed by the ERT Project Manager/Field Coordinator to evaluate adherence to the project QA Plan and the project Health and Safety Plan. Inspection will include (as appropriate):

- o Type and condition of equipment,**
- o Calibration procedures,**
- o Personnel qualifications,**
- o Decontamination procedures,**
- o Documentation.**
- o Level of personal protection**

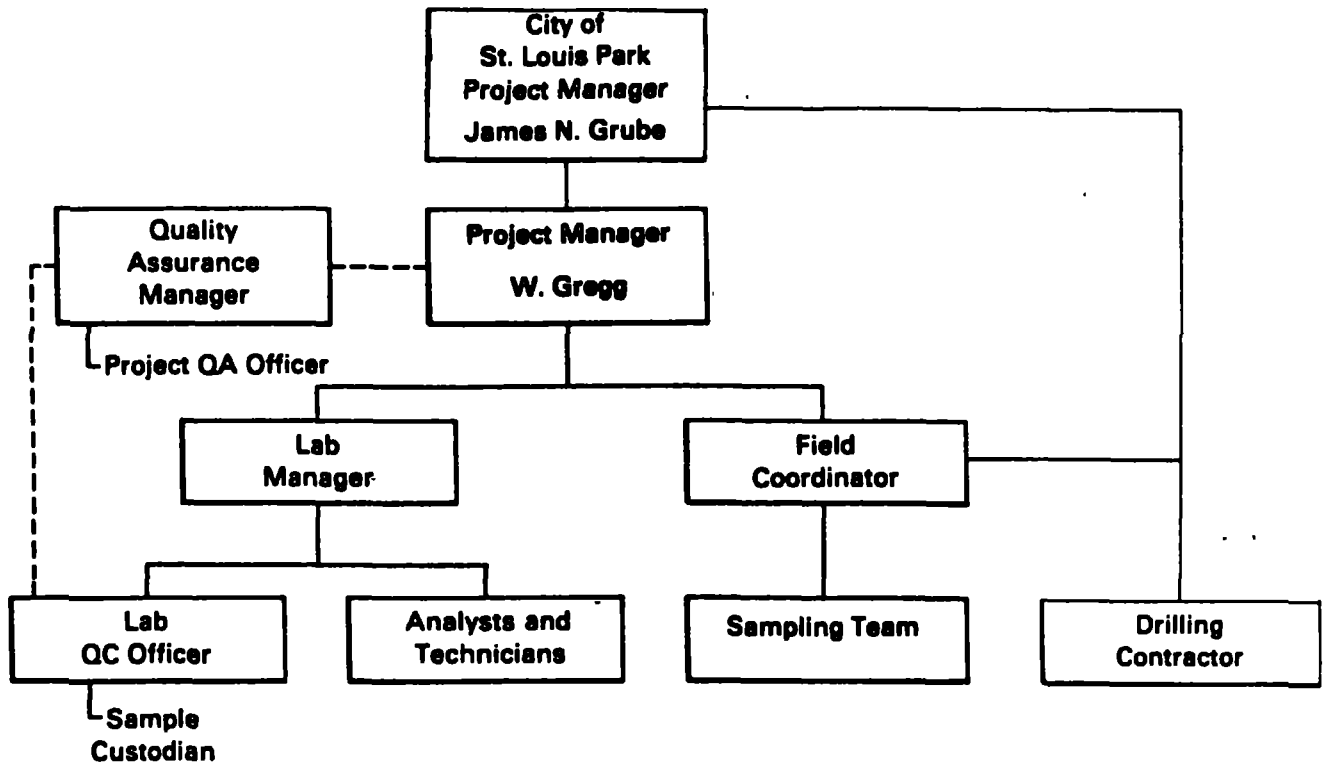


Figure 1-1 Project Quality Assurance Organization

Results of the inspection will be entered in the field notebook.

3.3 Document Control and Recordkeeping

Document Control for the remedial investigation serves a two-fold purpose. It is a formal system of activities that ensures that:

- 1) All participants in the project are promptly informed of revisions of the Quality Assurance Plan; and**
- 2) All critical documents generated during the course of the work are accounted for during, and at the end of the project.**

This QA Plan and all Standard Operating Procedure documents have the following information on each page:

- o Document Number**
- o Page Number**
- o Total number of pages in document**
- o Revision number**
- o Revision date**

When any of these documents are revised, the affected pages are reissued to all personnel listed as document holders with updated revision numbers and dates. Issuance of revisions is accompanied by explicit instructions as to which documents or portions of documents have become obsolete.

Control of, and accounting for documents generated during the course of the project is achieved by assigning the responsibility for document issuance and archiving. For the St. Peter Aquifer Remedial Investigation, the ERT Project Manager/Field Coordinator has this responsibility.

Documentation for the project will either be recorded in non-erasable ink, or will be photocopied promptly upon completion, and the photocopies dated. All documents will be signed by the person completing them.

3.4 Final QA/QC measures will satisfy local, state, and federal criteria and the objectives of the RAP.

4.0 NUMERICAL ANALYSIS AND PEER REVIEW

All numerical analyses, including manual calculations, mapping, and computer modeling will be documented and subjected to quality control review in accordance with ERT SOP 2005, Numerical Analysis and Peer Review. All records of numerical analyses will be legible, reproduction-quality and complete enough to permit logical reconstruction by a qualified individual other than the originator.

5.0 AUDITS AND CORRECTIVE ACTION

ERT conducts periodic audits to assess the level of adherence to QA policies, procedures and plans.

Whenever quality deficiencies are observed that warrant immediate attention, formal corrective action request forms are issued to the project manager by the Quality Assurance Department. The QA Department retains one copy of the form when it is issued. The project manager completes the form and signs it when corrective action has been implemented, and returns the original to the QA Officer to close the loop.

The Quality Assurance Department maintains a record of all corrective action requests and reports their status to ERT management in a quarterly report.

Should an audit be conducted on the St. Peter Aquifer Remedial Investigation work, St. Louis Park will be apprised of the audit findings and of any corrective action that is requested and performed.

SECTION C
HEALTH & SAFETY PLAN

SAFETY PLAN

for the

**St. Louis Park Site
St. Peter Aquifer Remedial Investigation**

Located in

St. Louis Park, Minnesota

Project Number: E317-500

Date: October 4, 1986

Revised: December 1, 1986

Approved By: William M. Hegg
Project Manager

Date: _____

SITE DESCRIPTION

WORK SITE DESCRIPTION:

Monitoring well installation work is to be performed in various public, commercial and residential areas within the City of St. Louis Park. This work will follow all appropriate regulations, including OSHA, State, and local codes, and the public's safety will be maintained. The work will possibly be into and through aquifers contaminated with creosote-related material.

COMPOUNDS OF CONCERN:

Coal tar and creosote. Species present may include phenols and Polynuclear Aromatic Hydrocarbons including, e.g. Benzo (a) Pyrene, Benz (a) Anthracene or Quinoline. These compounds are expected to be present at very low concentrations posing no direct exposure hazard to the work team. If elevated levels of the compounds are detected, a direct exposure hazard to the work team or general public may exist.

PHYSICAL STATE OF COMPOUNDS:

Dis^s_aolved or suspended in ground water in trace quantities.

FACILITY DESCRIPTION:

The facility is a park and residential area, a tavern and bowling alley, and a road.

HISTORICAL INFORMATION:

The ground water in St. Louis Park has been the focus of numerous studies which have generally determined the nature and extent of contamination in the drinking water aquifer (Prairie du Chien-Jordan) and the shallow aquifer (Drift-Platteville). Not as much information has been developed for the St. Peter Aquifer. The available information is summarized in Section A.

SCOPE OF WORK

PROPOSED DATE(S) OF FIELD ACTIVITY: To be determined.

PERSONNEL REQUIREMENTS:

<u>NAME</u>	<u>RESPONSIBILITY</u>
Bill Gregg	Coordinate Well Installation
Subcontractor	Perform Well Installation

TRAINING REQUIREMENTS:

Respirator training and respirator fit test. Cold weather operations.

PROPOSED ON-SITE ACTIVITIES:

Ground water monitoring well installation at five locations in the general vicinity of the site. (No activities within the Reilly Tar and Chemical Corporation site.)

SCOPE OF WORK:

Five groundwater monitoring wells to be installed.

HAZARD EVALUATION

OPERATIONAL HAZARDS:

Potential for extremely cold weather, if work is performed during winter months. Also, physical hazards associated with the operation of a drilling rig.

OVERALL HAZARD:

Anticipated LOW \longleftrightarrow Potential MEDIUM N/A HIGH

Overall hazard will be classified medium if contaminated water and subsoils are encountered during construction.

The existence of creosote compounds at sufficient concentrations may pose a direct exposure hazard to the work team or the general public.

The potential exists for exposure to hazardous substances, that have been shown to cause cancer in laboratory animals, during monitoring well installations.

PERSONAL PROTECTION REQUIREMENTS

RESPIRATORY PROTECTION REQUIREMENT: LEVEL D modified to Levels C or B as outlined below.

SPECIFICATIONS:

MSA Comfo II with Type GMC-H cartridges.

PROTECTIVE CLOTHING REQUIREMENT: LEVEL D (BASIC)

 X WORK CLOTHES/COVERALLS (long sleeved)

CHEMICAL PROTECTIVE CLOTHING. TYPE?

WORK SHOES (Steel Toe/Shank)

X BOOTS. TYPE? Slush type

<u>X</u>	GLOVES. TYPE? Nitrile - for handling tools and equipment
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X **HARD HAT**

FACE SHIELD

X SAFETY GLASSES/GOGGLES

MODIFICATIONS:

Level D protection shall be upgraded to Level C protection if total organic vapors in the air are above background to 5 ppm, as determined using an HNu meter, and a situation immediately dangerous to life and health (IDLH) will not exist. Level B protection will be necessary if total organic vapors are between 5 to 500 ppm above background levels and if IDLH conditions may exist. Level C protection constitutes: safety shoes, gloves, boots, fully body protective suit, full face respirator with particulate/acid gas/organic vapor cartridge, hard hat and safety shield. If noticeable odors or dust becomes objectionable, respirator protection should be used.

Hard hat/safety glasses required within 25 foot radius of operating drill rig.

MONITORING REQUIREMENTS:

1) INSTRUMENT: HNU PI-101

MONITORING PROCEDURE: Monitor breathing zone in accordance with manufacturer's instructions during soil boring operations.

2) INSTRUMENT:

MONITORING PROCEDURE:

PERSONAL DECONTAMINATION PROCEDURES

EQUIPMENT/SOLVENTS/SOLUTIONS:

Alconox, clean water.

DECONTAMINATION PROCEDURE(S):

- 1) ITEM(S): Gloves, boots and other equipment as necessary.

PROCEDURE: Wash with alconox detergent and rinse with clean water.

- 2) ITEM(S): _____

PROCEDURE: _____

DISPOSAL PROCEDURE:

General refuse for all consumables.

SPECIAL INSTRUCTIONS:

If visible creosote contaminated material is evident, all measures to prevent skin contact should be carried out. For example, tyvek suits, booties, gloves, and face shield, and hand tools should be decontaminated by soap and water at the end of each work day.

NOTE: The above specified decontamination procedures pertain to the decontamination of personal protective equipment only. Procedures for the decontamination of sampling tools and other related equipment should be specified in the subject work plan and/or QA plan.

EMERGENCY REFERENCE

AMBULANCE: 911

POLICE: 911

FIRE: 911

HOSPITAL: Methodist Hospital

Location: 6500 Excelsior Boulevard
St. Louis Park, Minnesota
932-5000

DIRECTIONS TO HOSPITAL:

The attached map indicates the location of Methodist Hospital relative to the proposed monitoring well locations.

A dry run by site Health and Safety personnel shall be conducted to Methodist Hospital from the general area of the monitoring well locations.

POISON CONTROL CENTER: 347-3141

NATIONAL RESPONSE CENTER: 1-800-424-8802

In case of emergency or serious accident, notify:

CORPORATE:

ERT/CONCORD, MA	617-369-8910
- KEVIN POWERS (HSM)	X 314 617-773-0484 (Home)
- SCOTT WHITEMORE (QA)	X 291 603-888-1174 (Home)
ERT/MINNEAPOLIS, MN	
- WILLIAM GREGG (PM)	612-541-1642

AGENCY REPRESENTATIVE:

MPCA Douglas J. Robohm	612-296-7288
EPA Daniel J. Bicknell	312-886-7341

CLIENT REPRESENTATIVE:

James Grube	612-924-2551
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NEAREST PHONE: Public phones in St. Louis Park

SECTION D
COMMUNITY RELATIONS PLAN

COMMUNITY RELATIONS PLAN

The St. Peter Aquifer Remedial Investigation is to be completed in accordance with the Consent Decree - Remedial Action Plan for Reilly Tar & Chemical Corporation's St. Louis Park, Minnesota, N.P.L. Site. All community relations programs related to this work will be coordinated through the following agencies:

United States Ms. Judy Beck

United States Environmental Protection Agency
(312) 353-1325

State of Minnesota Ms. Susan Brustman

Minnesota Pollution Control Agency
(612) 296-7769

City of St. Louis Park Ms. Sharon Klumpp

City of St. Louis Park
(612) 924-2523

Information necessary to conduct the Community Relations Plan will be provided by the City and Reilly.

St. Peter RT/FS - LT

RT plan - s/a wells + install 5mw to ID.
nature & extent of contamination

1. well location & design
2. s/a - 5mw + W14, W22P, W33, W22, W129, W133, P116, SLP3 (30day) - SLP3 + 6mw at 6mo - i at 12 months

FS - possible RA's for controlling spread of water that is > DW criteria in section 2.2 including GC sys
a. U.S.EPA may direct 2 GC wells + other actions

Simultaneous work of ERT RT plan using RPA as base


- mounding - the @ of the site - PDC's

- 1. bedrock valley by W133 & W24 - 2 arms

- a. S-SE flow in St. P after valleys; 1-2'/day; the E
- b. 36" Wooddale & 100' south of W38 - 2 may/L
- c. valley is deeper so. of A-A'

2. another south of the site

1. W48 - no Platte Limestone & shale - but makes up = 8'
a. Methodist Hospital (W48)

Plate 2 -  - the B'-B line does not mark edge of valley - additional info is needed

? - what is being done, about 7' x 9' PHE 100 ppt; SLP 14-14 ppt

a. w/ MDT as USEPA cannot on SLP's? naming - city letters

? - what is use of SLP3 - St. Peter / Platteville well - it's LT of PAA

✓ ? - effects of multi-aquifer wells, closings - St. P gradient was to maintain on the current flows; all M-A wells

2 - St. P / Platteville multi-aquifer wells - any I.D. study - RPA (1500 ppt) - flow w/ 820 head - St. P / PDC draws water - all movements - St. P

- Simultaneous - W21 & P113 - near bedrock valley? phase

✓ - diff. rates direction w/ hydrocarbons, not due to phase vs. soluble phase

✓ - ERT model: transmissivity < 1/2 value; leakage < ; seepage >; overestimated times PDC

✓ - Contaminant - drift / Platte have moved 4,000' to the east

✓ - last s/a date is 1-2'/day flows

- next phase

Plate 4?

mean 84'